The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 18 CHICAGO August 27, 1921

POST-OFFICE ENTRY — Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

ROCK PRODUCTS—

Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

Published every other Saturday by

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

TABLE OF CONTENTS

FEATURE ARTICLES

DEPARTMENTS

For Index to Advertisements See Page 71

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 18 CHICAGO August 27, 1921

POST-OFFICE ENTRY — Entered as second-class matter, July 2, 1907, at the Chicago, Ill., Post-office, under the Act of March 3, 1879.

ROCK PRODUCTS—

Geo. P. Miller, Manager
E. M. Gibson, Assistant Manager

Published every other Saturday by

TRADEPRESS PUBLISHING CORP.
542 South Dearborn Street, Chicago, Ill.

W. D. Callender, President.
N. C. Rockwood, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

TABLE OF CONTENTS

FEATURE ARTICLES

DEPARTMENTS

For Index to Advertisements See Page 71

Why this company uses Brownhoists

"We were so pleased with the results from our first crane that a year later we purchased another Brownhoist of the same capacity," says the president of the Lenox Sand and Gravel Company, New York City.

The Lenox Company are wholesale and retail dealers in sand, gravel and broken stone. Their two Brownhoists handle 300,000 tons of the above material per year at a cost of a little over 4 cents a ton. Besides an enormous saving in handling charges, the cranes make possible twelve deliveries per day per truck instead of five. And they enable this company to give faster delivery service to their customers.

A sturdy, economical Brownhoist should save you money on your handling work. These cranes are built in many types and sizes. Write for a copy of our catalog K if you are interested in cutting your material handling costs.

The Brown Hoisting Machinery Co. **Cleveland, Ohio**

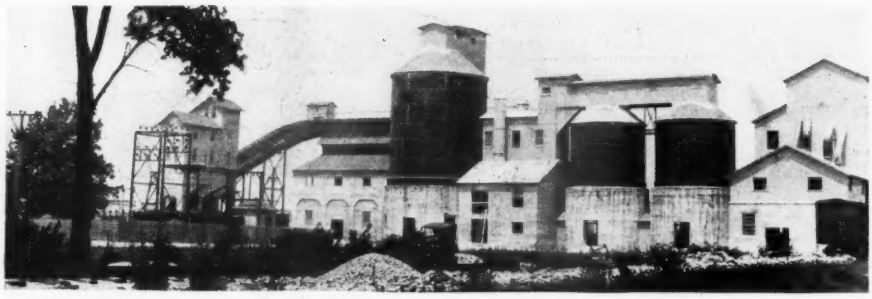
Branch Offices, New York, Pittsburgh, Chicago, San Francisco and New Orleans

Other Products: Buckets, Electric Hoists, Bins, Dock Machinery

BROWNHOIST

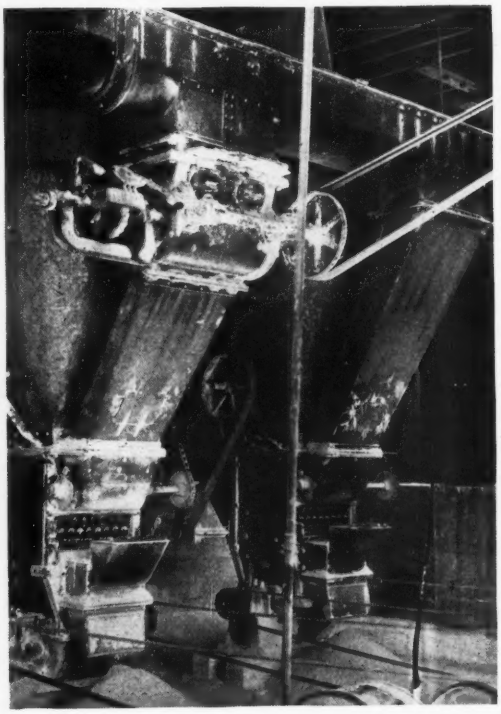
DEDICATED TO QUALITY SINCE 1880

When writing advertisers please mention ROCK PRODUCTS



The Raymond at the Luckey Plant

The two Raymond Finishing Mills here shown are part of the equipment of the new, up-to-the-minute Luckey Lime plant operated by the Luckey Lime & Supply Co., of Luckey, Ohio.



In low power per ton, low maintenance cost and superiority of product produced, Raymond Pulverizers with air separation outstrip any other type of equipment for handling Hydrated Lime.

Raymond Bros. Impact Pulverizer Co.

1301 North Branch Street Chicago, Ill.

Eastern Office
5th Floor, Grand Central Palace
New York City

Western Office
201 Boston Building
Denver, Colo.

McGinty Grates

Used in these Six Arnold Type Kilns

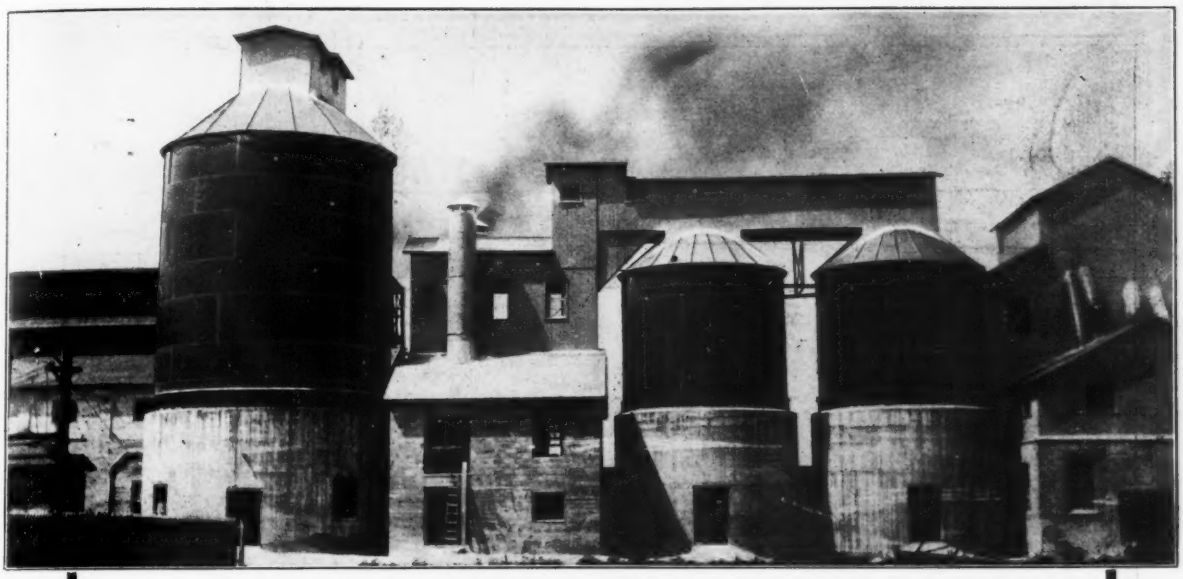
The McGinty Grate, scientifically designed and constructed to meet the high duty and capital requirements of Kiln and Hydrating practice, are now in use in the six Arnold Type Kilns operated by the Luckey Lime and Supply Company at Luckey, Ohio.

This is but one more bit of evidence that engineers are rapidly adopting the McGinty Grate because they will not only withstand a higher degree of heat without warping than any other grate now on the market, but because of the increased air area will carry a deeper bed of fire than is possible on old style bars.

It is a sifting, shaking and dumping grate combined.

THE KRAMER BROS. FOUNDRY COMPANY
Dayton, Ohio

Our Grates are made of a Material of which the melting point is from 400° to 600° higher than Gray Iron.



Plant of the Luckey Lime and Supply Company, Luckey, Ohio

Undivided Responsibility

A divided responsibility is rarely efficient or satisfactory; then why take a chance when DES MOINES shoulders all the responsibility of design, fabrication and erection of industrial plants?

The plant of the Luckey Lime and Supply Company, of Luckey, Ohio, is modern in every detail, and affords an example of the work DES MOINES is equipped to handle. The steel work for the buildings, the three great bins for the storage of crushed limestone are representative of the products of our three fabricating plants.

It should be noted that the service given by DES MOINES is *complete*, from the acceptance of the order to the delivery of the plant, in accordance with specifications. The responsibility for the order is undivided.

Let us call your attention to the fact that we maintain a corps of consulting and designing engineers who are ready at any time to confer with you and your engineers, and for such conference you will be under no obligation whatever.

Write for a catalogue, and let us consider your requirements

Pittsburgh-Des Moines Steel Co.

846 CURRY BUILDING, PITTSBURGH, PA.

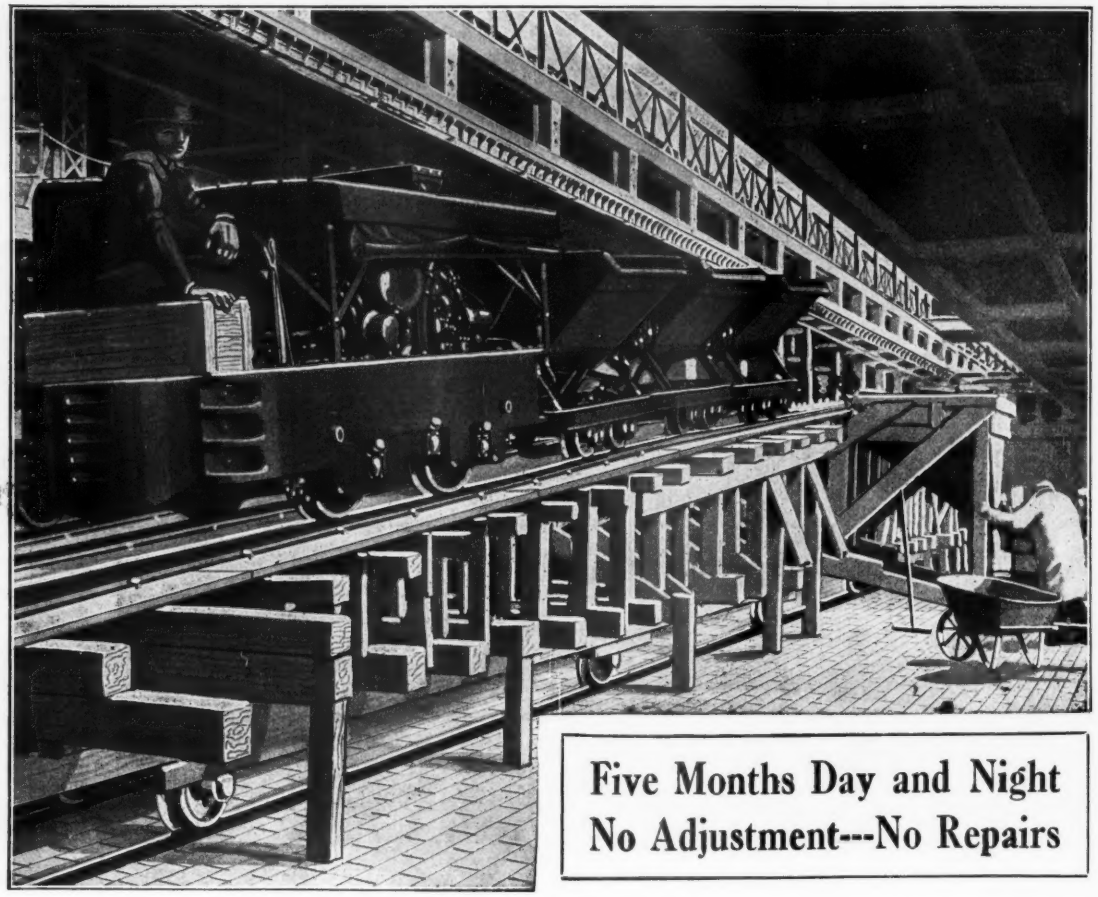
DES MOINES, 946 Tuttle Street
NEW YORK, 246 Hudson Terminal
CHICAGO, 1246 1st Natl. Bank Bldg.
WASHINGTON, 946 Munsey Bldg.
SAN FRANCISCO, 346 Rialto Bldg.
DALLAS, 1246 Praetorian Bldg.

Canadian Des Moines Steel Co., Ltd., 246 Inshes Ave., Chatham, Ont.

DES MOINES TANKS TRADE MARK

DES MOINES

DES MOINES TANKS TRADE MARK



Five Months Day and Night No Adjustment---No Repairs

For five months a 3-ton PLYMOUTH Gasoline Locomotive was employed by The H. F. Friedstadt Co., General Contractors, in operations for the government at the Naval Base, Hampton Roads.

The contractors say in a letter that it gave wonderful service. Notwithstanding it was used continuously day and night, and oftimes full 24 hours without a let up.

They add that a grade of full 12 per cent or better did not reduce the efficiency of the Locomotive. Neither was it necessary to adjust the eugine or make repairs of any sort.

There's a PLYMOUTH awaiting your order and ready to give you a like service without complaint, or demand for increased pay. It is built to serve and take the grief and knocks.

Write for descriptive literature.

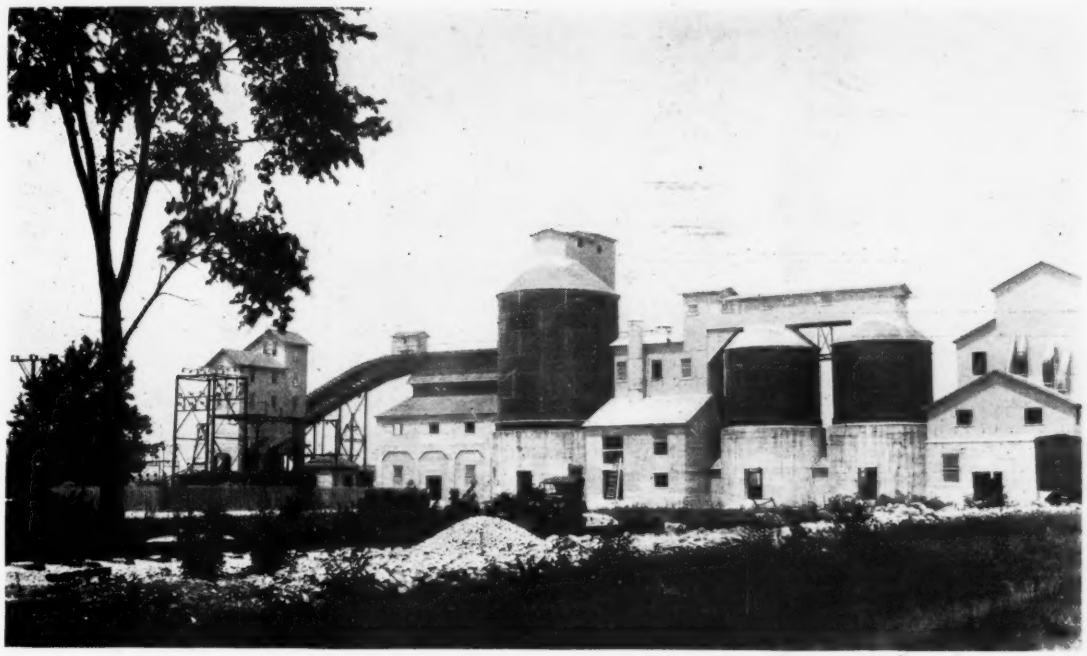
THE FATE-ROOT-HEATH COMPANY, Plymouth, Ohio

PLYMOUTH

Gasoline Locomotives

Rock Products

Vol. XXIV | Chicago, August 27, 1921 | No. 18



General view of plant of Luckey Lime and Supply Co., Woodville, Ohio

C. C. Martin, General Manager

New Ohio Lime Plant

Luckey Lime and Supply Company Enters Ohio Finishing Hydrate Field

THE LIME PLANT of the Luckey Lime and Supply Co. at Luckey, Ohio, was formally opened on July 19, as announced in our July 30 issue. About one year ago the quarry for this plant was opened, so the formal opening of the plant came as a sort of anniversary. The Luckey plant is reputed to be one of the most complete and up-to-the-minute lime plants in the country.

Quarry Operation

The limestone resources of the company comprise 61 acres of dolomite with the following analysis:

Calcium Carbonate	54.93%
Magnesium Carbonate	45.02%

Wm. Hessman, Superintendent

Boiler room and power house

Crusher plant

Iron	.025%
Silicon	.025%
	100.00 %

At no point on the entire property will more than 2 ft. of stripping be required, and in many places the limestone outcrops. From tests of samples taken from deep borings it is found that the deposit

Well drill

is over 400 ft. deep, with the same analysis throughout. The company will operate the quarry to a depth of about 60 ft.

With the exception of some of the superstructure the entire plant is permanently built of steel and concrete. An inspection shows both the excellent workmanship in its construction and the thought that was given toward making its exterior appearance attractive.

It is the intention of the Luckey Lime and Supply Co. to manufacture only finish hydrate and crushed limestone. The present capacity of the hydrate plant is 150 tons daily and the capacity of the crushing plant is 100 tons a day. Kiln stone, as explained further on, does not go through the crushing plant.

The Crusher Plant

At present the crusher plant is supplied by means of a stiff-leg derrick handling one-yard dump buckets from the quarry. A two-yard rocker dump roller-bearing car receives the stone from a hopper into which the buckets are dumped. This car, operated by an electric cable hoist, deposits the stone on the crusher platform. From the initial No. 4 gyratory crusher the material is elevated by means of a pan conveyor to a revolving screen with three sizing jackets. Under the screen, hoppers distribute the material to three separate loading bins equipped with both bottom and side-loading chutes for loading cars and trucks or wagons.

Lime Plant Operations

For supplying the kilns, 2-yard rocker dump, roller-bearing cars are also used and are hauled up the incline by cable hoists, motor operated. As may be seen in the illustration of the tipple there are two tracks on the incline, passing on the two sides of the kilns and making charging from both sides possible. Besides insuring a more even distribution of material in the kilns, the double haulage system, with two separate electric hoists, will make shut-downs for haulage repairs very unlikely.

The man on top of the kilns operates the hoists from a control house at the top of the incline, from which point he can overlook both the quarry and the charg-stop, start, or reverse the cars at any point.

Loading operation in quarry

Tipple and charging tracks to kiln

All stone for calcining is hand picked in the quarry, and only sizes suitable for burning in the kilns are loaded. Only the stone not suited for calcining is now run through the crushing plant for commercial crushed stone.

The Kilns

The present installation includes six Arnold kilns. In the plant design provision has been made for a second battery of six kilns identical with the first. This second battery, when it is installed, will extend from the present kilns to the bagging-room and bag storage house in the unoccupied space shown in the layout.

The August 14, 1920, issue of Rock Products described the opening of the quarry and gave the layout plan of the kilns, hydrate mill, loading and fuel tanks, and showed the provision for future extension. This plan has been followed closely in actual construction, as may be seen from an inspection of the various illustrations of the completed plant.

The kilns are lined with standard firebrick laid in such a manner that the lining when completed resembles a flattened bottle or flask. Over the six kilns is a storage hopper providing a continuous flow of stone.

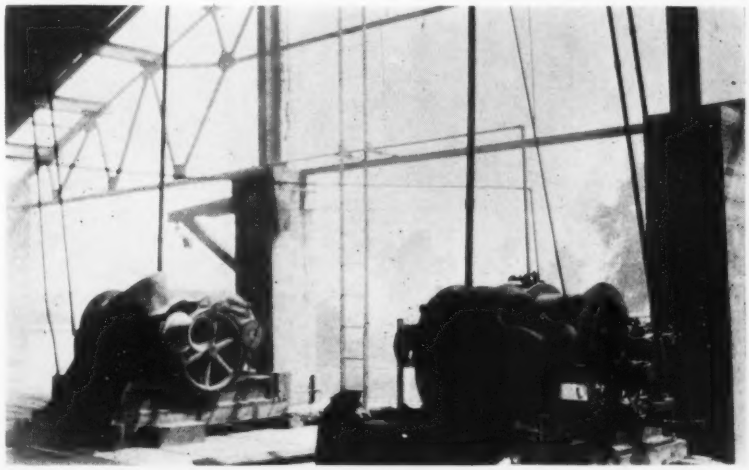
The fireboxes are of the external type and only the gases of combustion come in contact with the stone. Coal screenings are used as fuel, steam being injected under the grates. The coal-handling plant is not yet completed but is now being built. It will automatically convey the fuel from the storage bunkers to the firing floor as it is needed. Each firebox is equipped with "McGinty" shaking grates, manufactured by Kramer Bros. Foundry Co., Dayton, Ohio.

Each kiln is drawn every four hours, there being about four tons of lime to each draw. One feature of this installation is the extra large cooler capacity, insuring a cool lime when drawn as well as the conservation of heat that would otherwise be wasted. Besides increasing the fuel ratio this also improves the product.

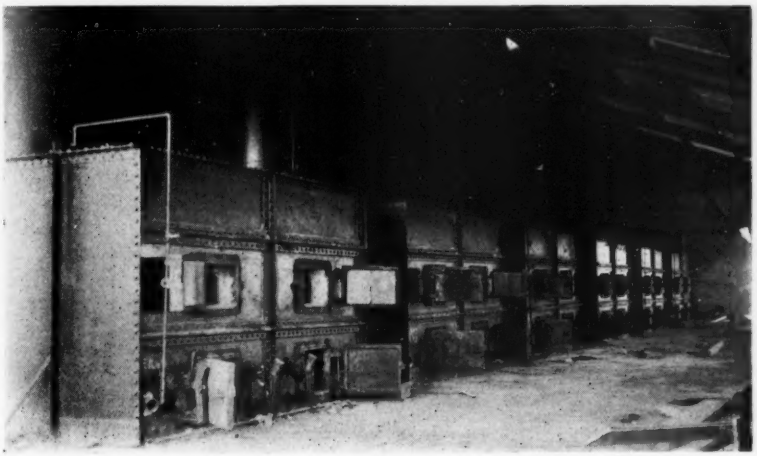
Pneumatic Draw Shears

Pneumatic draw shears make it easy for one man to draw from the six kilns. A dividing wall in the cooler also makes it possible to draw either side or both sides. The shears operate rapidly and permit lumps clogging them to be easily discharged.

The draw-shear controls have been extended to the firing floor so that the firemen can do their own drawing. This makes it unnecessary to signal to the floor below and makes better drawing possible. It also eliminates the draw men required where the drawing is done by hand. It is operating very satisfactorily.



Electrically operated hoists



Furnaces for lime kilns—Note shaking grates

Grinding and Hydrating

Lime drawn from the coolers is carried on a conveyor to a Williams hammer mill, from which the ground lime is elevated about 80 ft. into a steel plate storage tank of 1,500-ton capacity.

Two Clyde batch hydrators are located on the second floor. Ground lime is taken from the hopper bottom of the 1,500-ton storage tank by screw conveyors and is elevated to charging hoppers above each hydrator. The operation of the conveyors and elevators is made automatic so

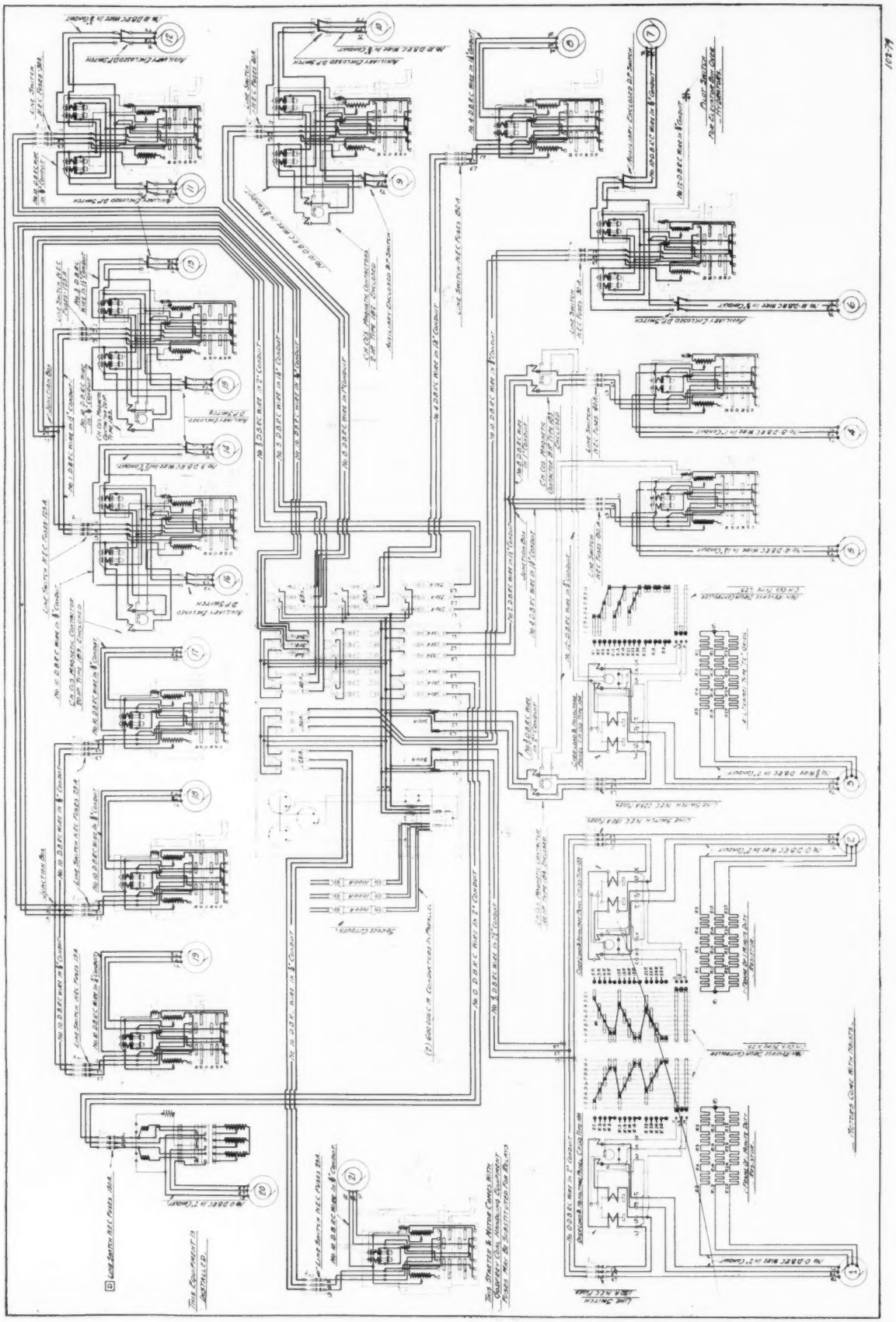
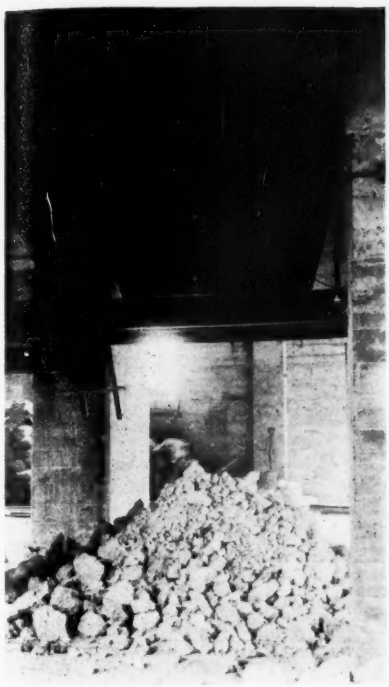


Diagram showing methods of electrical control at plant of Luckey Lime and Supply Co.



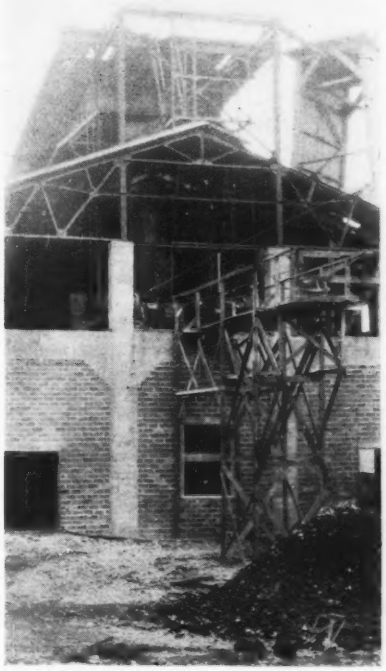
Cooling hopper of lime kiln

that they deliver only the required amount for each charge to the hoppers. The water is similarly measured automatically into tanks above the hydrators.

From the hydrators the lime is drawn into one of the two storage tanks, each with a 300-ton capacity, where it is allowed to season for 24 hours. These two tanks are filled and emptied on alternate days and have been installed with sufficient capacity to take care of the ultimate plant output from 12 kilns. In the present arrangement a double storage capacity for hydrate is provided, which will take care of ordinary shutdowns of grinding and bagging machines.

Interlocking Conveyor Control

In designing all conveying and elevating equipment care has been taken to make it automatic in its emergency operation. The controls are so arranged that the clogging and stopping of any conveyor, elevator or machine, will automati-



Temporary trestle for handling ash

cally stop the operation of all equipment that would tend to effect or aggravate the trouble. As an example, if the elevator to the storage tank from the hammer mill clogged or stopped for any reason, both the conveyor feeding the hammer mill and the hammer mill itself would immediately be stopped without any manual operation. This plan has been followed throughout the entire plant.

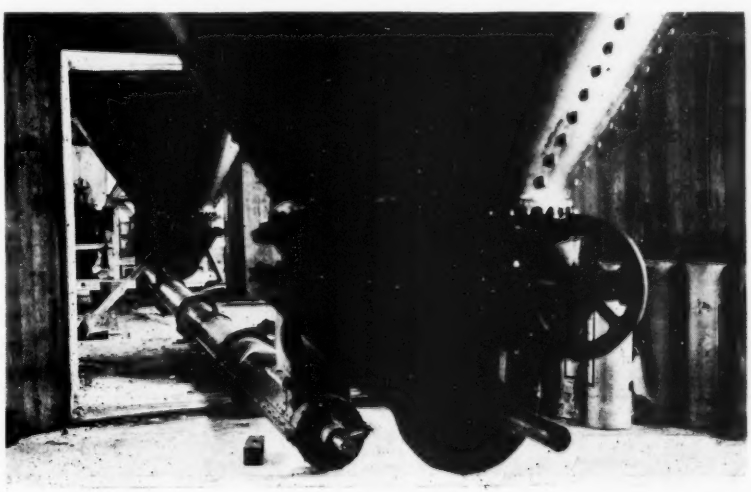
Apart from the selection and arrangement of the best electrical equipment, the design embodies many features unique in the control of the motors. Especially is this so, when considered from the angle that all standard equipment was used, which is a desirable feature in itself, as it will be an easy matter to secure spare parts in case of repairs.

Motors No. 3, 4 and 5 (see accompanying drawing) respectively drive the hammer mill, pan conveyor and elevator. The pan conveyor receives the material and delivers same to hammer mill, which in turn discharges by means of spout to an elevator. There are times when either or all of these units, due to numerous causes, will choke up or overload, and so to prevent such an occurrence the three motors are interlocked by means of magnetic contactors ahead of the line switches for motors No.

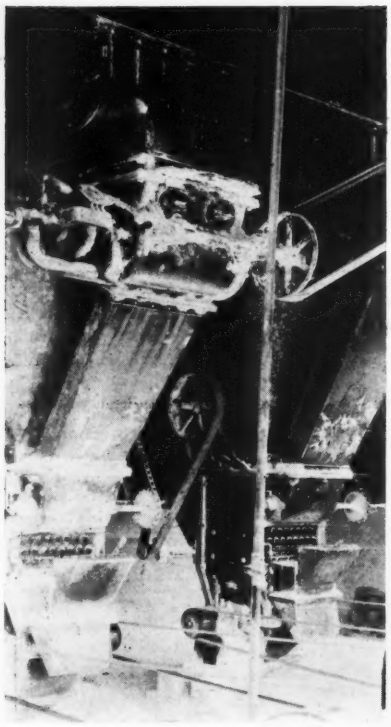
Pan conveyor delivering to Williams mill

3 and 4. The magnet coil of the former contactor is connected in parallel with the no voltage coil of the starting compensator for motor No. 5, while the magnet coil of the latter contactor is connected in parallel with the no voltage coil of overload panel for motor No. 3.

To illustrate the operation, consider the elevator to be overloaded, pan conveyor and hammer-mill running normally. Considering overload on the elevator of such proportions as to cause the overload coils on the compensator to trip, which causes no voltage release to trip, stopping motor No. 5, simultaneously magnetic contactor is released, breaking two phases, causing no voltage release to trip, stopping motor No. 3, causing the second magnetic contactor to



Hoppers and screw conveyors underneath hydrated lime storage tanks



Raymond mills

release, breaking two phases, tripping no voltage release on compensator, stopping motor No. 4.

The action being similar to the above in the case where hammer mill would choke, with exception that elevator would continue to operate while mill and conveyor is stopped (a desirable feature), thus permitting the obstructing material to be taken away as fast as removed from the mill.

In the case where pan conveyor is the choked or over-burdened unit, its respective motor would stop by action through overload cells on compensator permitting the mill and elevator to continue operating.

At no time would it be possible to start these motors out of their proper sequence as follows:

Normally starting	*Normally stopping*
5—Elevator	4—Conveyor
3—Mill	3—Mill
4—Conveyor	5—Elevator

However, it is possible to stop them all instantly by releasing catch on compensator for motor No. 5.

Throughout the plant similar inter-locking features are provided, each to meet the individual requirements.

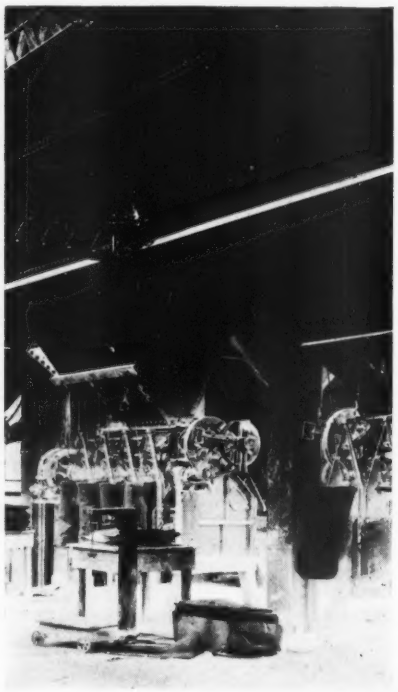
Finishing Mill

Two Raymond mills and air separators take out all impurities from the hydrated lime and pulverize it. The finished product is elevated by vacuum to two storage bunkers over the bagging machines. The capacity of each of the storage bunkers is 280 tons, giving a total bulk storage of finish hydrate of 560 tons.

Bagging and Bag Storage

Two Bates 4-valve bagging machines are installed at the present time. The loading track is immediately in front of the bagging machines, making trucking from baggers to cars easy. There is also a bag storage capacity in one end of the bagging house to take care of at least two days' run.

Storage for fully 15 days' run of the kilns has been provided at this plant, insuring it against shutdowns and slow firing during temporary car shortages or other emergencies.



Bates baggers and steel storage bins

Boiler House

The boiler house is located near the corner of the kiln house. This furnishes steam for the kilns and power to operate a deep-well pump and air compressors. Air lines are run to the quarry to operate jack hammers and throughout the plant airhose provide means for blowing accumulated lime dust from the various motors and furnish the power for operating the draw shears.

Personnel

All of the conveying and elevating machinery throughout was made by the Webster Mfg. Co., Tiffin, Ohio. All the machinery is operated by Allis-Chalmers motors. The structural and plate steelwork was done by the Pittsburgh-Des Moines Steel Co. The plant was designed and construction supervised by Arnold & Weigel, contractors and engineers, Woodville, Ohio. William Hessman, operating superintendent of the plant, was also superintendent of construction for the company which handled the building of the plant itself. C. C. Martin is general manager.

New Big Crushing Plant to Utilize Gold Dredge Waste

THE RICHMONDITE PAVING CO., Sacramento, Calif., has purchased 1000 acres of land near Oroville, strewn with gravel and boulders cast up by the gold dredges of the Oro Dredging Co. The paving company, it is reported, will begin at once the construction of a $300,000 crushing plant to convert these boulders into commercial crushed stone and gravel.

Clyde batch hydrators

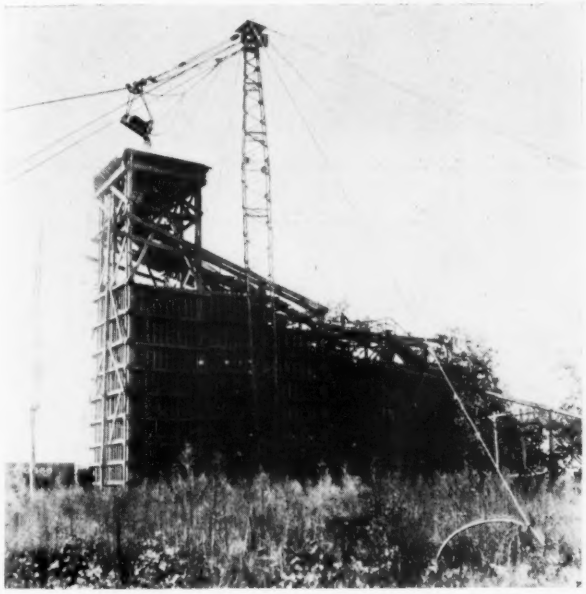
New Alabama Sand-Gravel Plant

Premier Sand and Gravel Company's Plant at Jackson's Lake—Details of Operation

ONE OF THE NEWEST SAND AND GRAVEL PLANTS to be erected in the South within the last year is that of the Premier Sand & Gravel Co., at Jackson's Lake, Ala. This plant is claimed by its builders to be one of the most modern washing and screening plants in the South and is one of the pioneers in the promotion of washed and screened gravel against the ordinary pit-run material in that section.

The sand is a natural deposit on the border of the Alabama River and is very clean naturally, except for a certain amount of loam which is easily disposed of by the washing plant. There is also an over-burden of 4 ft. of clay which is stripped before the sand is dug. The sand shows a strength in mortar tests of 131.6 per cent compared with standard Ottawa sand. This unusual strength is due to the natural sharpness of the sand and also to the thorough washing and grading that is given to it.

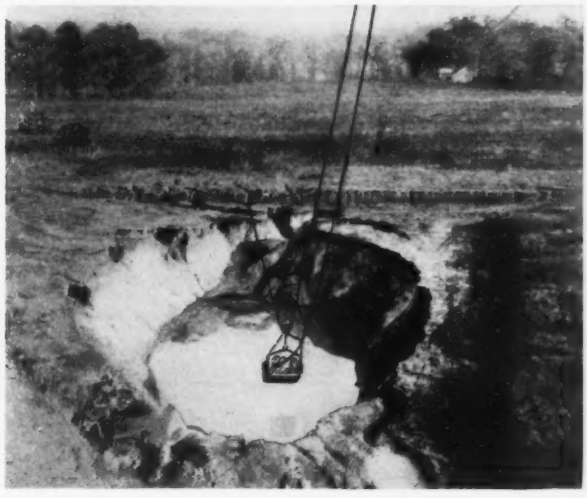
The deposit runs to an average depth of 50 ft., water being struck at 30 ft. From the surface to the water is about 90 per cent sand and from there down the gravel starts. The gravel gets larger the deeper it is dug, but very little is found over 2½ in. in size. The sand has been used by the United States Government in the construction of the Wilson Dam, at Florence, Ala., and is used by the steel mills in and around the Birmingham district for construction work.



1—General view of plant

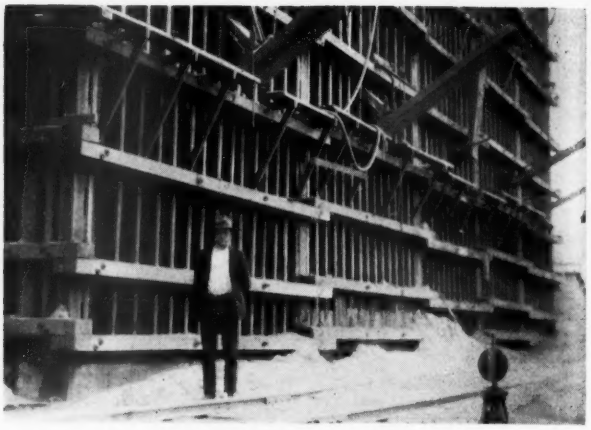
2—Plant and pit, showing dragline cableway excavator in operation

3—Pit at start of operations, June, 1920

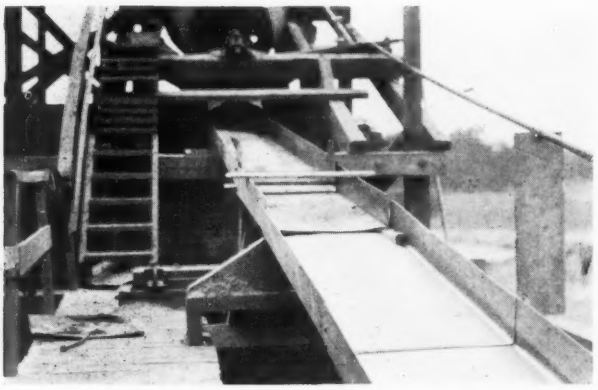


4—Pit in September, 1920

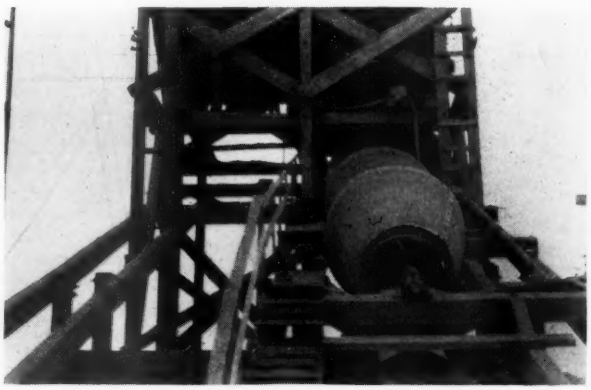
5—Pit in May, 1921



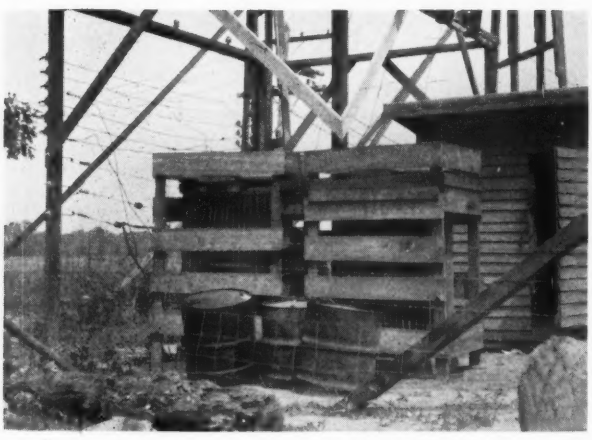
6—W. A. Winston, superintendent, in front of loading spouts



8—Metal flume from screens



7—Screening unit



9—Transformer units ready to be installed

10—Storage for empty cars

Drag-line Cableway Excavator

The deposit is excavated by means of a Sauerman drag-line cableway excavator with a 1½-cu. yd. bucket. The cableway runs over a space of 600 ft. and is attached to a steel mast 110 ft. in height. The drag-line is operated by a 150-h.p. Lidgerwood hoist. (The hoist operation at this plant was explained in the "Hints for Superintendents" department in the June 4, 1921, issue of Rock Products.)

The drag-line bucket deposits into a hopper, 70 ft. above ground level. This hopper is fitted with a slide gate on the side. Water coming through a 4-in. pipe, also in the hopper, flushes the sand through the gate and chutes it to the screens. The plant here was originally designed for a double set of conical screens, but to date only one set has been installed, with provisions made for the other.

Washing and Screening

The washing plant is of the standard Link-Belt Co., design and has its equipment throughout. The screens are of

1¼-in. mesh, ¾-in. mesh and ⅜-in. mesh, followed by two Dull sand settlers for separation of fine and coarse sand. The material from the screens under ⅜-in. runs over a metal flume containing a steel plate with ⅛-in. perforations. The material under ⅛-in. is flumed off to the first sand separator, while the oversize passes on to the second separator. The products from these two separators are the main products of the plant. There are two sand bins of 150 tons capacity each and two gravel bins of 200 tons capacity each.

The plant is located on a spur from the Louisville & Nashville R. R. and has one loading track on the side of the plant. The present switch for empty cars at the plant holds 16 cars and another switch is being built alongside of the first switch. The second switch will also hold 16 cars, making a 32-car storage for empties at one time. All of the empty cars come down to the plant by gravity and the loaded cars run down from the plant by gravity also.

Power

This plant is electrically-operated throughout. It has a capacity for 1,000 tons of sand and gravel per 10-hour day. The power used to operate the plant is purchased from the Alabama Power Co., which has a hydro-electric plant on the Coosa River.

The power is first brought in at the first sub-station, where it goes through a set of three 200-kva. transformers and is stepped down from 44,000 v. to 2,400 v. It is then run another quarter of a mile to a second set of transformers with a 150-kva. capacity, and here it is cut down again to 220 v.

A 15-h.p. motor is required for driving the screens, a 40-h.p. on the centrifugal pump for the water supply, and a 150-h.p. on the hoist, making a total of 205 h.p. to operate the entire plant.

Personnel

The sales of this plant have been in the hands of the Standard Fuel & Material Co., of Birmingham, whose organization consist of J. I. McCants and W. D. Lewis, Jr., of the old Standard Portland Cement Co., of this city.

The president of the Premier Sand & Gravel Co. is C. B. Kershaw; T. M. Porterfield is treasurer; W. H. Brooks, manager; J. L. Brooks, secretary, and W. A. Winston, superintendent.

Lo, the Poor Gravel Man!

THE DISCOVERY of the Buffalo Gravel Corporation by the New York state legislature's investigating committee, and its subsequent prosecution for alleged violation of the anti-trust laws has already been noted in these pages. Harassed business men elsewhere will certainly sympathize with David Hyman, president of the company, who is quoted by a local newspaper as follows:

"Here is a difference of opinion among lawyers for which we have to suffer indictment and prosecution. The lawyers tell us it cannot be helped, and that even the supreme court of the United States divides, five judges to four, and four judges to three, in the decision of cases under the anti-trust law. If the judges of the highest court of the country are not able to agree among themselves as to what is or what is not a violation of the law what is a business man to do?

"What kind of a system is this that makes the business man find out at the peril of his liberty whether or not he has transgressed the law when his intentions were honest, and his business is actually a public service and benefit, as well as a benefit to himself?

"Is it not time that there should be set up in the country somewhere a court, commission or tribunal, to which the business man can go and ask whether or not something which he proposes to do is in conformity with the law or against its policy? What is the matter with the law, and with the judges, and with the lawyers, that they leave things in such a state of uncertainty?"

The answer to Mr. Hyman's question is easy. The laws are made by lawyers to furnish employment to lawyers. When we send reputable business men to congress, instead of to jail, we will have a happier and more prosperous country.

Edwin Brooker Made Traffic Representative for Sand and Gravel Producers

THE INCREASED VALUE to the members of the National Association of Sand and Gravel Producers of securing expert advice with reference to traffic matters, particularly with regard to freight rates, has been especially apparent during the last year. The necessity for additional work along this line was emphasized in connection with the preparation for the freight rate conference with the railway traffic executives held at Washington on June 2.

Realizing the advantages to be gained, the National Association has employed Edwin Brooker as traffic representative to give assistance in the handling of freight rate and other traffic problems of sand and gravel producers.

Mr. Brooker, who assumed his duties with the association several weeks ago, has had twenty years of experience in traffic and transportation work. He commenced his training in the offices of the Central Freight Association, where he received technical and practical knowledge of the fundamental principles of rate and tariff construction, as well as a thorough acquaintance with all traffic regulations.

After serving six years with the Central Freight Association, Mr. Brooker was appointed chief clerk of the Tariff Bureau of the Erie Railroad at Chicago, and two years later was made chief of tariff bureau of the same railroad, which position he held continuously until May 1, 1915. During this period he was a member of the committee on uniform basis of rates, as well as the brick and sand committee of the Central Freight Association, and represented the Erie Railroad at all conferences involving traffic matters.

During 1915 and 1916, after leaving railroad service, Mr. Brooker appeared as expert witness in a number of cases before the Public Utilities Commission of Ohio, particularly in complaints of the Akron Gravel and Sand Co., the B. F. Goodrich Co., and other Ohio shippers, and was successful in securing favorable adjustments in rates and switching charges for shippers at that point.

Mr. Brooker later re-entered railroad work as general freight and passenger agent of the Pittsburgh, Lisbon & Western Railroad and later was appointed traffic manager and finally assistant general manager in full charge of operations of this railroad.

During the past two years Mr. Brooker has been engaged in commercial traffic work, one year of which included service as traffic manager of the Pennsylvania Sand and Gravel Producers Association. His work in connection with the preparation and presentation of the complaint of the Western Pennsylvania producers before the Pennsylvania Public Utilities Commission is well known. With the knowledge he gained in the handling of this case regarding sand and gravel freight rates, together with his extended experience with traffic matters in general, it may be expected that his work with the National Association will result in material benefits to its members.

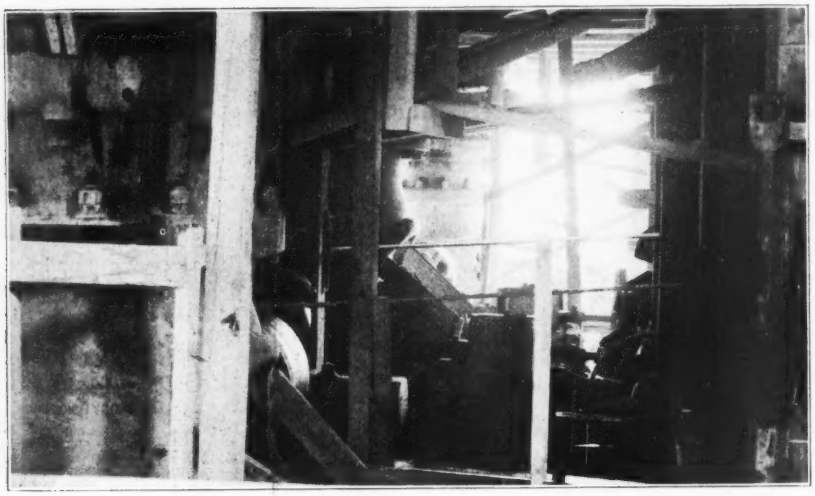
In order that no undue advantage may be derived by any group or section of producers, it has been considered necessary to adopt a system of charging for time and traveling expenses of Mr. Brooker when it is necessary for him to leave Washington in the especial interest of individual producers or of state and district associations.

With the addition of Mr. Brooker to the office staff at Washington, it will be possible for the National Association to give a greater service with reference to traffic matters. In so far as practicable, assistance will be rendered to individual member producers in the handling of traffic problems and in aiding state and district associations in their negotiations with the railroads and before state commissions and the Interstate Commerce Commission for reasonable freight rates. —*The National Sand and Gravel Bulletin.*

Hints and Helps for Superintendents

One Elevator Serves Three Crushers

THE VIEW HEREWITH shows a battery of three gyratory crushers served by a single bucket elevator at the plant of the Norton Lime and Stone Co., Cobleskill, N. Y.



Gyratory crushers and reclaiming bucket elevator

The center crusher is a No. 9 gyratory, and is the primary breaker. The elevator is centered with this large crusher and takes the output to two 24-ft. screens, placed end to end, at the top of the plant.

The feed divides at the head ends of the screens, which do the sizing for the commercial stone. The rejections from each screen go by gravity to two No. 6 gyratory crushers, erected on either side of the primary breaker.

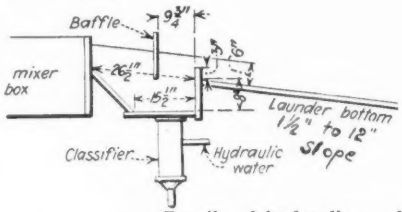
The two No. 6 crushers discharge to two slightly inclined belt conveyors, which empty into the same elevator boot as the No. 9 primary crushers. Thus one elevator (a 36-in. belt and bucket type) serves all three crushers and a single battery of screens serves for both sizing and scalping —a very simple and apparently effective arrangement.

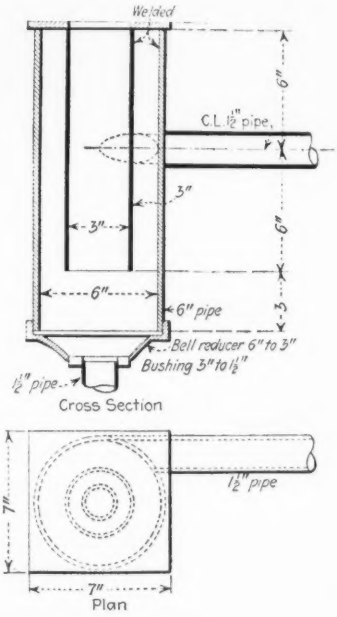
F. P. Norton is superintendent of the plant.

Hydraulic Sand Classifier

AS Edmund Shaw has shown in his series of articles on "Sand Settling and Sand-Settling Devices," there are many things used in the metal mining industry which can be adapted to the sand and gravel operators' use. The device shown herewith was described in a recent issue of "Engineering and Mining Journal," by W. R. Canton," as a classifier designed to give a fairly close classification and to take up a small amount of space.

This classifier is described as follows: It is constructed (as shown in Fig. 1) of materials easily accessible around a large plant and is inexpensive. The outside is of 6-in. pipe, and the feed inlet is of 3-in. pipe, to which is welded the top of ¼-in. plate. A 1½-in. pipe brings in the hydraulic water on a tangential line. The bottom is formed by a bell reducer reducing from 6 in. to 3 in. Into this is screwed a 3 to 1½-in. flat reducer. A 1½-in. pipe forms the discharge which carries away the sands.



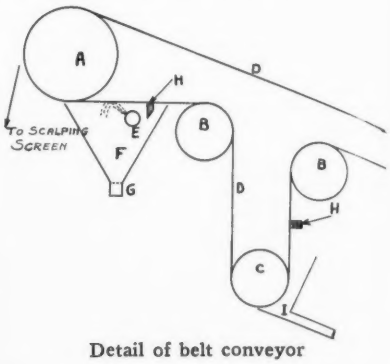


Details of hydraulic sand classifier (Figs. 1 and 2)

Fig. 2 is a sketch to scale showing the installation. This classifier has given efficient service in making a separation at 40 mesh, and will give good results over a range from 6 long tons to 13.6 long tons per hour. Nine months' use has shown no appreciable wear except that of the discharge spouts.

A Belt Conveyor Washing Device

BELT CONVEYORS that carry damp sand and gravel are often a source of

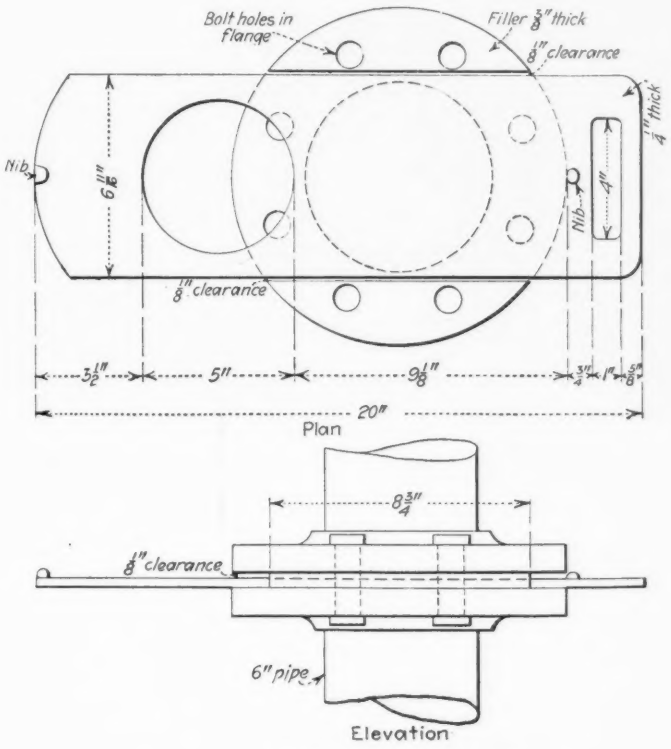


Detail of belt conveyor

trouble to the plant superintendent caused by this material clinging to the belt after passing over the head pulley. To prevent this "carry back" of material and also to eliminate wear on the belt, the Interstate Sand and Gravel Co. worked out a scheme for washing the conveyor belt. In the accompanying illustration: A = head pulley, B = idlers, C = gravity take-up pulleys, D = belt conveyor, E = 2-in. perforated pipe for belt-washing spray, F = hopper to catch washings from belt conveyor, G = chute from hopper to screening plant, H = ½-in. x 30-in. x 8-in. squeegee rubbers placed at an angle across the belt face, I = off-bearing "launder" for material from squeegee.

It may be well to add that the spray is

made by boring a row of ¼-in. holes in a 2-in. pipe. The water from these holes is directed against the under side of the returning belt. Pressure of the spray is regulated by a valve. No water is lost by this device since the chute *G* carries it to the screening plant. The squeegee rubbers are clamped between two 1-in. boards so that the rubber projects about 1½ in. and is so constructed that the rubber may be fed through the boards as it wears off. The squeegees are held constantly touching the belt by means of counter-weights. These devices are in use at the Interstate Sand and Gravel Co.'s plant at Libertyville, Ill. Burton H. Atwood is the president of the company and Charles A. Adams is the superintendent.



Detail of ore discharge gate

Bin Gate

A DETAIL DRAWING for an ore discharge gate is shown in the accompanying sketch. Instead of the 6-in. pipe discharge shown, a bell reducer followed by a bushing with any desired opening may be used. The apparatus is bolted to the bottom of the bin and attached to the 6-in. drop pipe by a 6-in. flange. The only wearing part is the discharge bushing. This gate will give a steady flow of material.—"Engineering and Mining Journal."

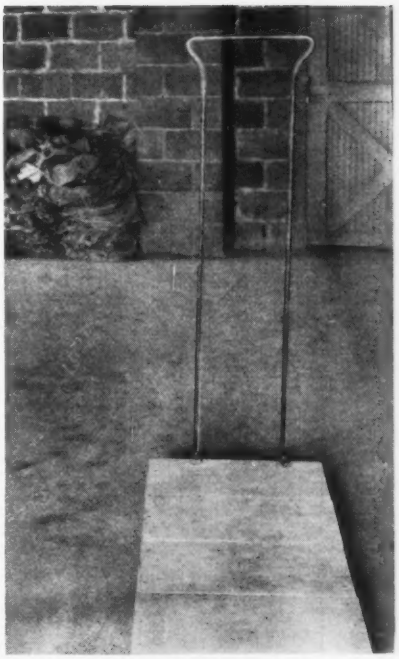
Bag Turning Device

THE TWO VIEWS presented herewith show a device used for turning cement bags right side in at the plant of the Indiana Portland Cement Co., near Greencastle, Ind.

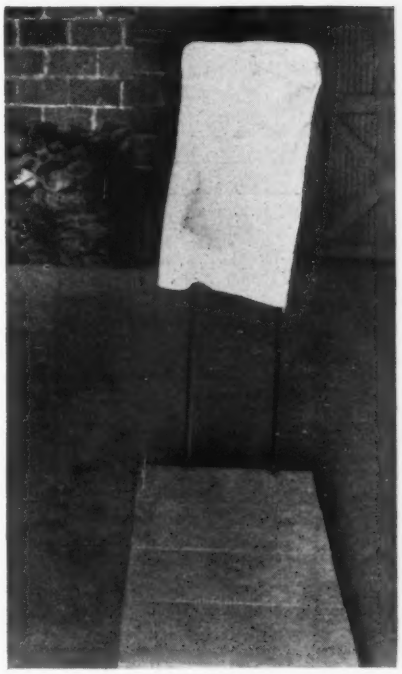
The device consists of an inverted "U" frame which is securely anchored to a heavy wooden base. The "U" frame can be made of light piping or of steel or iron rod.

The bags coming back to the plant from the consumer are first put through a large bag cleaning machine, which draws out any remaining cement dust that may happen to be in the bags. The bags are then sent to the repair department, where they are sewed and patched, and from here they are sent to the sorting department. Up to this point the bags are turned inside out. At the sorting department the bags are turned right side in by placing the corners of the bag on the edge of the "U" frame of the bag turning device, and by drawing the bag down it turns right side in. From here the bags are sent to the bag-tying machines where they are automatically wire tied, thus fitting them for valve bag service.

The president and general manager of the Indiana Portland Cement Co. is Adam L. Beck, a man who is well known throughout the entire cement fraternity. John Curtis is acting superintendent of the plant.



Bag turning device



Bag turned right side in

Exchange Your Ideas

SUPERINTENDENTS from time to time find out new ways of doing old things or adapting old ways to new things. Nearly everyone has some pet kink that it would be profitable to him to exchange for the pet kink of the other fellow. This department is the place to make the exchange. —*The Editors.*

New Connecticut Plaster Plant

The Connecticut Adamant Plaster Company, New Haven, Connecticut, Completes New Plaster Mill—Latest Economies in Plaster Manufacture

HAVING HAD THEIR PLANT destroyed by fire in July of last year, at the height of the building season, the Connecticut Adamant Plaster Co., New Haven, Conn., determined, that when they rebuilt, their new plant would be of fireproof construction. They also felt that in the new plant advantage should be taken of all the latest economies in plaster manufacture.

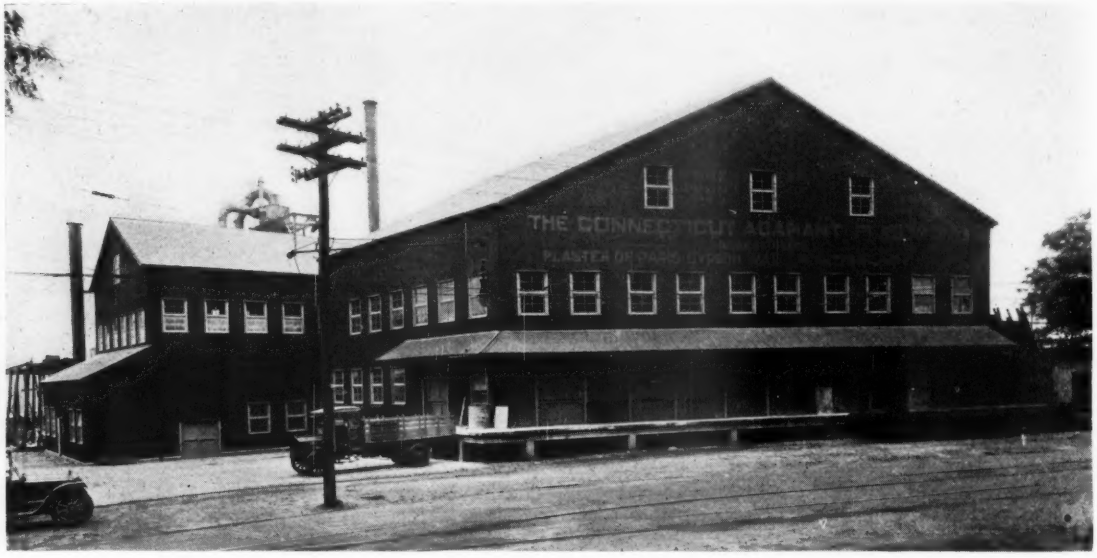


Fig. 1—Warehouse, Connecticut Adamant Plaster Co., New Haven, Conn.

Although The Connecticut Adamant Plaster Co., is one of the oldest producers of plaster in the United States and its officers have had many years experience in the plaster business, it was felt by them that there were many advantages to be obtained by employing outside experts to design their new mill for them. Richard K. Meade and Co., Chemical and Industrial Engineers, Baltimore, Md., were retained to prepare plans and specifications for the new mill and warehouse.

The new plant was placed in operation in July and was making plaster on the first anniversary of the fire. It is of steel and concrete construction and embraces the most approved methods for plaster manufacture. The accompanying photographs will give a very good idea of the plant, the general arrangement of which is shown in the accompanying sketch. As will be seen by referring to Fig. 5 the plant consists of three departments; the plaster mill, the mixing plant and the warehouse. The mixing department and the plaster mill are in the shape of an "L," the short branch of which joins the warehouse. The space between the warehouse and the plaster mill is paved and forms a storage for the coal to be used in the kettles and dryers.

The warehouse is 85 ft. by 75 ft., the mixing department 61 ft. by 30 ft. and the plaster plant 44 ft. by 86 ft. Fig. 2 shows the rock storage, the plaster mill and the mixing department, while Fig. 1 is a view taken from the front of the warehouse. The end of the plaster mill can also be seen to the left of this view.

Rock Storage

The gypsum employed is obtained by water from Canada. The Connecticut Adamant Plaster Co. own a large and very

Fig. 2—Rock storage and plaster mill

Fig. 3—Dryer and Raymond mill

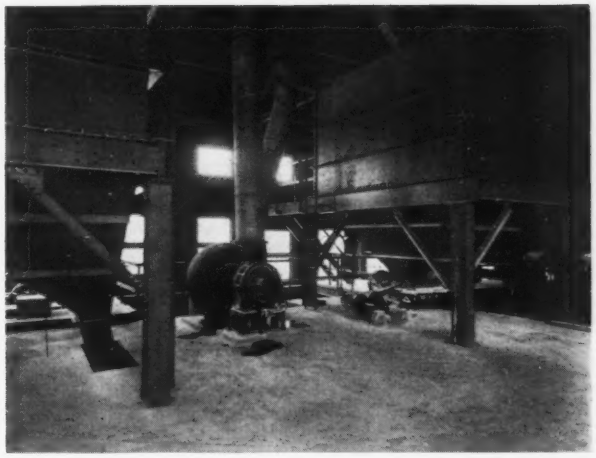


Fig. 4—Bins for dry gypsum

fine deposit of gypsum rock in Nova Scotia. The rock is brought in by schooners and steamers and unloaded at the dock by means of a derrick and bucket into small cars. These operate on the elevated tramway shown in Fig. 2 and dump the rock into storage piles. This arrangement of derrick and cars was employed in the old plant. As it was not destroyed by the fire, it was decided to use it for the present as it serves very well to take care of the present requirements of the mill. It is the intention, however, to replace it by more modern methods of unloading when the tonnage requirements of the mill become larger.

The rock is conveyed from the piles to the plant by small dump cars operating on portable track. The loading of the cars is done by hand. Two or three men are sufficient to handle the 70 to 80 tons per day of rock needed by the plant. On arrival in the plant the rock is first crushed in an 18-in. by 26-in. gypsum nipper and then cracked to about one inch pieces and smaller by means of an 11-in. rotary crusher of the "coffee mill" type.

The nipper and cracker are set in a pit beneath the floor. Owing to the nearness of the river and the character of the soil, the waterproofing of the walls and floor of this pit represented quite an engineering problem, but it was successfully accomplished. The top of the hopper feeding the crusher is on a level with the ground. The crushed rock flows by gravity from the crusher into the cracker and the product

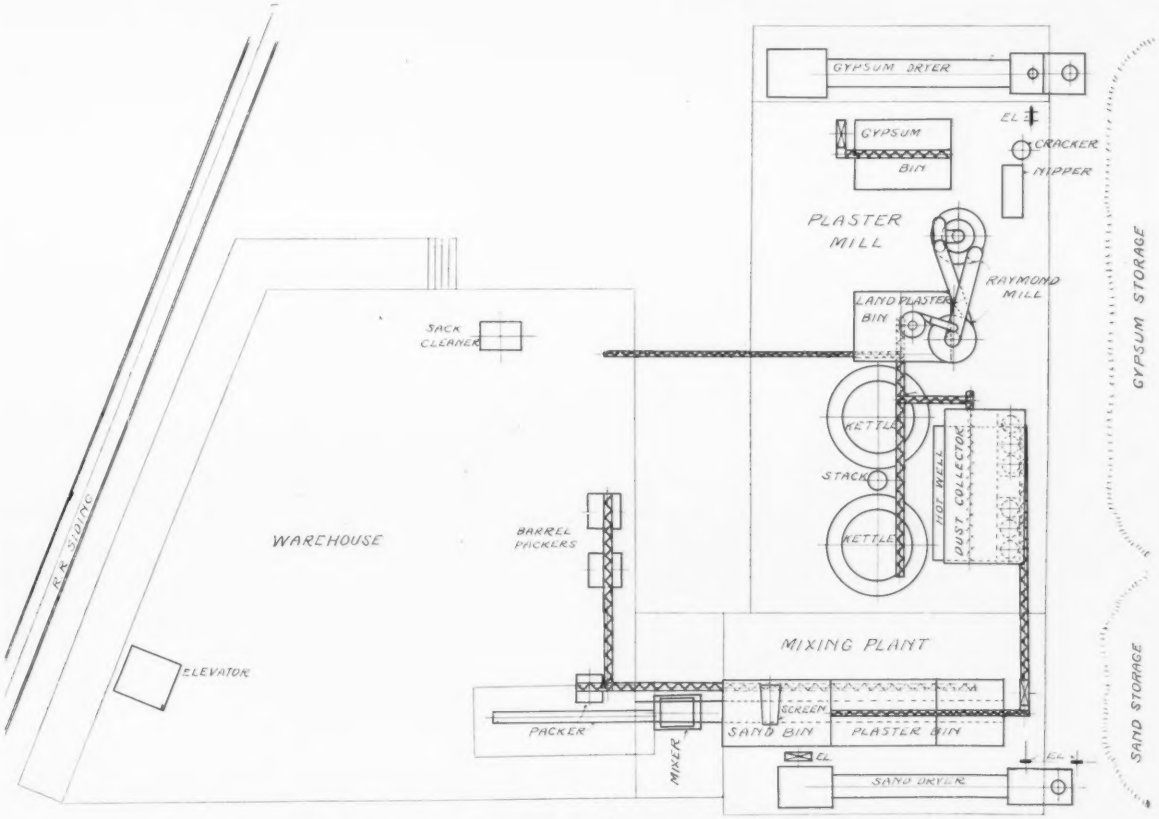


Fig. 5—General layout of plant of Connecticut Adamant Plaster Co., New Haven, Conn.

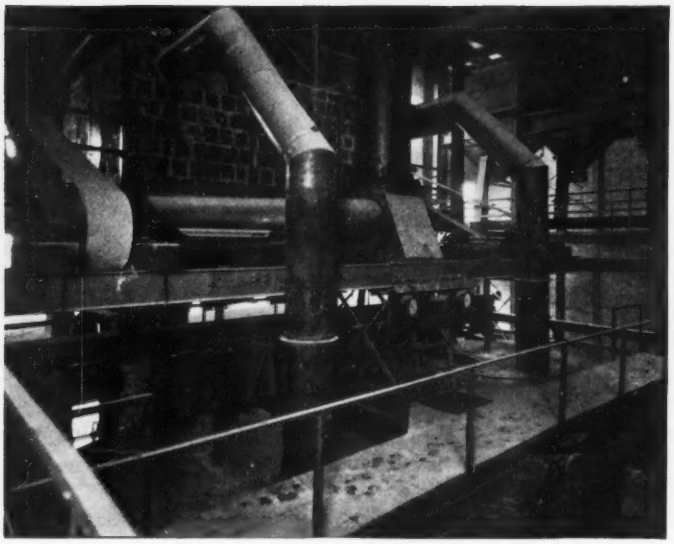


Fig. 6—Dust collector and top of kettles

Fig. 7—Kettles for calcining

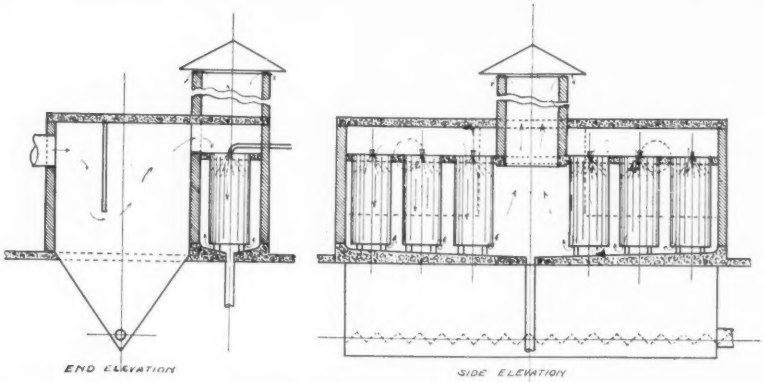


Fig. 8—Dust collector

of the latter is elevated by means of a chain bucket elevator into a rotary dryer. This latter is 4 ft. in diameter and 30 ft. long and is of the direct heat type. This type of dryer is much more efficient than the ordinary indirect heat dryer. The danger of contaminating the gypsum by means of soot, etc., has been eliminated by proper design of the fire box and setting of the dryer.

Pulverizing the Gypsum

The rock passes from the dryer into a large storage bin from which it is fed to the Raymond mill. This storage bin is sufficiently large to hold one day's supply of dry gypsum.

The gypsum is pulverized to the degree of fineness desired in the plaster before being calcined, as by doing this in one stage rather than in two, both coal and time are saved in calcining. The pulverizing is done by a 5-roller Raymond mill and with it plaster of practically any degree of fineness desired may be obtained. This mill is much more efficient and gives a finer product than burr stones. The dressing of the latter also now represents a problem, as men who are skilled in this art are scarce, while the repairs on the Raymond mill are

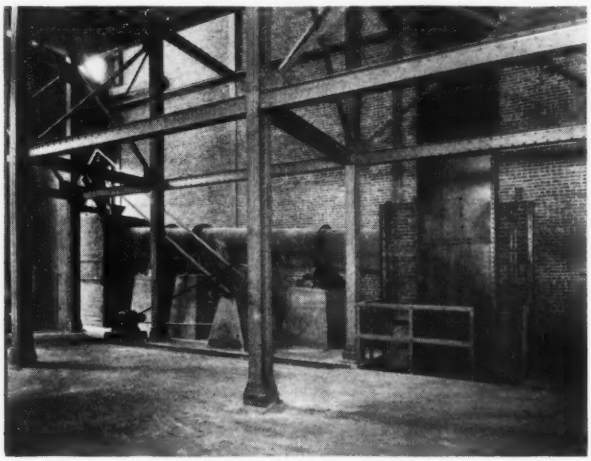


Fig. 9—Sand dryer

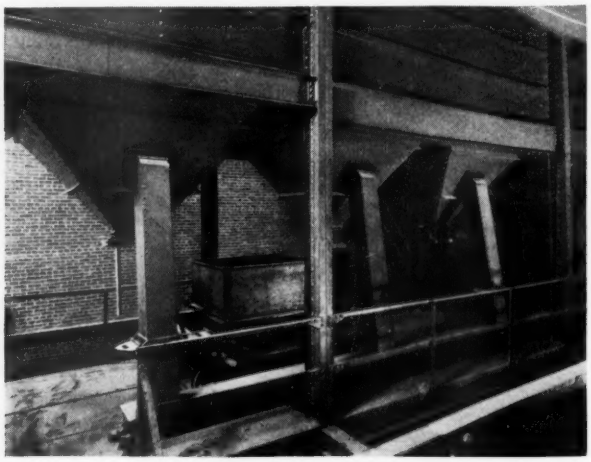


Fig. 10—Mixing bins and scale

light. At the present time, only one mill is needed but provision has been made for the installation of another Raymond mill when desired.

Fig. 3 is a view of the gypsum dryer and the Raymond mill. The crusher and nipper are located beneath the floor opposite the door which is seen just beyond the Raymond mill.

The fine product from the Raymond mill is sucked up by an exhauster and discharged into a collector above the land plaster bin. Incidentally, these collectors are also located out of doors, as will be seen by referring to Fig. 5 in order to save building space.

Fig. 4 shows the Raymond exhauster. To the left of this can be seen the bin for the dry gypsum from which the Raymond mill is fed and to the right the land plaster bin.

The kettles are charged from the land plaster bin by means of an especially designed screw conveyor which feeds the gypsum evenly and without flooding into the kettles. Another screw conveyor from this bin also passes over into the warehouse and by means of this land plaster (or the uncalcined ground gypsum) can be packed and sold.

Calcining

The gypsum is calcined in kettles as it has been shown that this is the most satisfactory method of making a high grade plaster. There are two 10-ft. kettles which were made by Butterworth & Lowe, Grand Rapids, Mich. Sufficient room has been left for the installation of a third kettle. Fig. 7 shows the two kettles.

The kettles are provided with recording pyrometers and their operation can be observed from a steel gallery passing over the top of the kettles. The degree of firing of the kettles is under entire control of the attendant. A small blower is provided so that the temperature may be increased at any time by forcing the draft.

The hot well into which the kettles dump is located behind the kettles and is made of concrete. It is provided with automatic feeders which feed the material out of the well into a system of conveyors and elevators which carry it into overhead bins in the mixing department.

Dust Collection

The steam and dust from the kettles are led into a dust collecting system, a sketch of which is shown in Fig. 8. This system is divided into two parts, a dry chamber and a wet chamber. The dust laden steam is first led into the dry chamber where the coarser dust is deposited. The dry chamber is provided with a hopper bottom and the dust collected here is conveyed back into the kettles by means of a screw conveyor. The steam then passes over into the wet chamber where it is thoroughly sprayed with water and the fine dust is caught. This chamber consists of a compartment in which are located a number of vertical, 30-in. diameter concrete pipes down through which the gases are passed and at the top of which the sprays are located. The dust is washed out of the steam by the fine mist from the sprays. No effort is made to separate the fine material from the water and it is carried away by the latter and discharged into the river. The water for the sprays is furnished by a small centrifugal pump direct connected to a motor.

This system of spray chambers was worked out by the engineers for gas washing and has been employed by them wherever wet washing of gases can be used. It depends for its efficiency on the fact that the gases are divided into a number of small streams which are sufficiently reduced in area to be thoroughly sprayed.

Fig. 6 shows the top of the kettles and the flues leading into the spray chamber. The pyrometers are shown on the board between the two kettles and also the stack which carries the products of combustion away from the kettles. The calcined plaster bins in the mixing department are shown in the upper right hand corner of the picture.

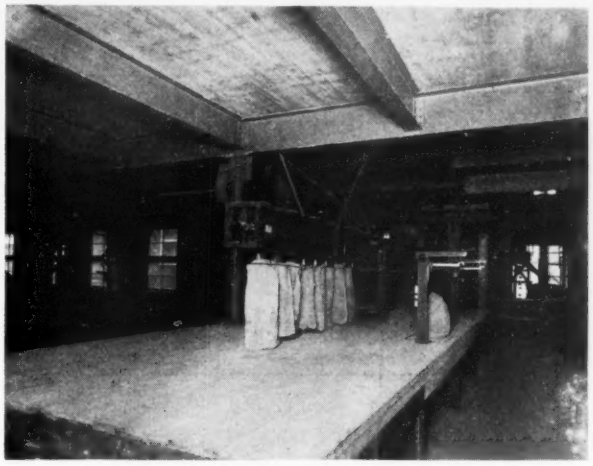


Fig. 11—Broughton mixer and packer

Mixing Plant

The Connecticut Adamant Plaster Co. manufacture a considerable quantity of mixed and sanded goods. The sand for this is washed at the bank and received at the plant in scows where it is unloaded by the derrick at the end of the wharf. It is conveyed into and out of storage by the same system of cars employed for the gypsum rock. The sand is dried by means of a 30-ft. by 30-ft. rotary dryer and the dried sand is elevated and screened into a bin in the roof of the mixing department.

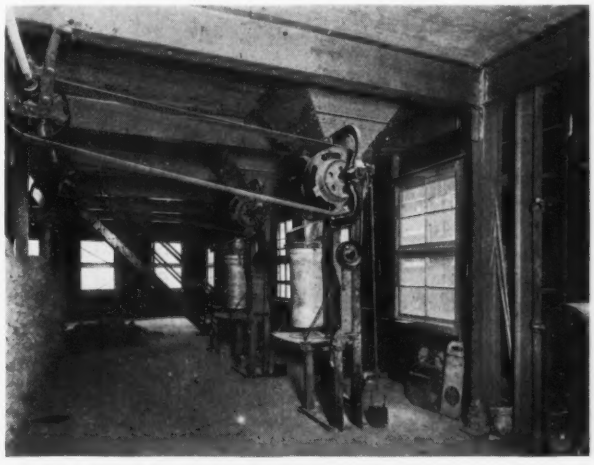


Fig. 12—Barrel packers

The sand dryer and elevator are shown in Fig. 9. Both the rock and sand dryers were furnished by Wm. P. Heineken, 95 Liberty Street, New York City.

The bins for the plaster and sand are located in the roof of the mixing depart-

ment. There are three of these bins, two of which are for plaster and one for sand. The bins are provided with hopper bottoms and close fitting gates. The proportioning of the sand and plaster is done by means of a 1-ton scale car which operates on a track below the bins. The scale is provided with two beams which can be set at the desired weights of plaster and sand so that the proportioning is accurately done. The mixing itself is effected by means of a Broughton mixer located in the warehouse. The retarder and other ingredients of the plaster are weighed out on a small scale and added in the hopper above the Broughton mixer.

Fig. 10 shows the scale car and the bottom of the bins. Provision has also been made to pack plaster of Paris from these bins by means of the screw conveyor shown at the bottom of this picture.

The Broughton mixer and arrangements for packing the mixed plaster are shown in Fig. 11. This consists of an extension to the Broughton mixer in which a screw conveyor operates. A large number of openings are provided to the conveyor trough and the bags are slipped on these. When the desired weight has been obtained they are carried to the edge of the platform, tied and dropped on trucks.

As mentioned previously, plaster of Paris can be drawn from the plaster bins by means of the screw conveyor running underneath the bins and provision has been made to pack this in either bags or barrels. The bag packer is located on the same platform with the Broughton mixer but the barrel packers shown in Fig. 2 are on the floor of the warehouse.

Warehouse

The warehouse is in two stories. The lower floor is on a level with the floor of the cars so that bags and barrels to be shipped can be trucked directly into either the cars or on to the auto trucks. The second floor is used for the storage of bags, retarder, hair, asbestos and other ingredients which are used in making adamant plaster. The two floors are connected by a platform elevator which is employed to raise the materials to the second floor.

There is also a sack cleaning wheel in the second floor. This is placed over a hopper so that the plaster, etc., taken from the sacks can be conveniently handled.

All of the machinery in the plant is driven by individual motors. The screw conveyors and elevators are driven by means of back geared motors, while the Raymond mill exhauster is directly connected to its motor through a flexible coupling. Each of the kettles has its own motor. All elevators have steel casings except those for the wet sand and gypsum. All screw conveyors have steel troughs with covers except that from the hot well which has a concrete trough. All spouts are made of steel.

Construction

The buildings are of steel frame and were fabricated and erected by the Lehigh Structural Steel Co., Allentown, Pa. They are covered with asbestos protected metal. The stairs are of steel with diamond plate treads. This latter material is also used for platforms and galleries. All openings, belts and gears are guarded with steel railings.

All of the buildings and machinery foundations and ground floor are of concrete and the second floor is of reinforced concrete. The contractors for the concrete work were the Sperry Engineering Co., New Haven, Conn. The owners installed the machinery themselves. All work was done under the general supervision of Richard K. Meade & Co.

Personnel

The officers of The Connecticut Adamant Plaster Co., are: W. H. Kellogg, Sr., president; H. H. Barnes, vice-president; G. A. Kellogg, treasurer; W. H. Kellogg, Jr., secretary; A. F. Hemingway, assistant secretary.

In addition to plaster of Paris for finishing, moulding and casting, the company produces a number of plaster products including a special adamant asbestos plaster which is largely specified by architects throughout New England, also wood fiber pulp plaster, neat adamant plaster, asbestos prepared boiler covering, etc.

Only the purest and whitest Novo Scotia gypsum is employed by The Connecticut Adamant Plaster Co., in making their plaster. The sand is carefully washed, screened and graded and the other ingredients are carefully selected. The greatest care is used in the manufacturing operations which are under perfect control in the new plant. As a consequence of this, their products are of the very highest quality. The plaster is unusually white in color, uniform and slow in setting time, and very plastic, cool and smooth working. It is also much finer than the general run of plasters. Each lot of plaster is carefully listed before being shipped which insures the customer against faulty material.

Tennessee Rates on Road Materials Condemned

THE INTERSTATE COMMERCE Commission, in a report on No. 12132, Tennessee Rates and Charges, opinion No. 7078, 63 I. C. C., 160-78, condemned rates on stone and gravel for use on the public highways maintained by state authority, as resulting in undue prejudice to shippers of interstate traffic, in undue preference of shippers of intrastate traffic, and unjust discrimination against interstate commerce. The defendant carriers, upon whose petition the case was originated, are required to remove the undue prejudice and unjust discrimination, by putting into effect, not later than Oct. 13, the rates specified in Ex Parte 74.

Shortly after the commission made its report in Ex Parte 74, the Tennessee commission permitted similar increases on freight and passenger fares and other charges, "except on road building material (when consigned to federal, state, county or municipal authorities or their bona fide agents), sand, gravel, brick, sewer pipe, fertilizer and fertilizer material." The excepted things were suspended, except as to the traffic carried by the Tennessee Central, Birmingham & Northwestern and the Gulf, Mobile & Northern. On account of their need of money they were permitted to make a 25 per cent increase on the expected commodities. In November last year the Tennessee commission vacated its suspension order, but prohibited any increase in rates on sewer pipe, and stone and gravel to be used on the public highways.

Tennessee objected to the introduction of rates on sand and gravel for road building on the ground that Section 22 said that nothing in the act should be construed to prevent the hauling, at reduced rates, for states or municipalities, or without charge to them; also that inasmuch as rates for state or municipal governments were not required to be filed with the commission, Tennessee could not make comparison with rates made for interstate application. To adopt such a construction of Section 22, the commission said, would make it mandatory for carriers to maintain lower municipal rates on intrastate traffic. The section, it said, had been uniformly construed as permissive and not mandatory.

In authorizing higher rates on sand and gravel used commercially the Tennessee commission impliedly approved, the report said, the level of the rates on sand and gravel as increased under its own permission, in line with the permission granted as to interstate rates in Ex Parte 74.—*Traffic World.*

Proposed Tennessee Freight Rate Increase Declared Unlawful

A PROPOSED increase in local mileage rates on sand, gravel, and slag between stations in Tennessee of the Nashville, Chattanooga & St. Louis Railway, was declared unlawful by the railroad and utilities commission in an order issued in reference to Supplement 8 to the Local Mileage Commodity Tariff No. 1 of the N. C. & St. L. railway.

The proposed increased rates were declared unlawful by the commission, due to the fact that such rates and charges were in excess to those approved by the Commission and entered November 19, 1920.

It was ordered by the commission that Supplement 8 to Local Mileage Commodity Tariff No. 1 be declared unlawful by the Commission, and that same be not accepted for filing.

Sand Settling and Sand-Settling Devices

No. 7. Devices from Which the Settled Material Is Mechanically Removed

By Edmund Shaw
Allen Cone Co., El Paso, Tex.

WHAT IS PROBABLY the prototype of the class of settling devices described in this and the succeeding article is still to be found in the mountainous parts of Mexico in ore mills of native design. It consists of a shallow box with a bottom sloping up one side. The feed is let in at one end and out of the other, and as the current slows down from widening of the box the sand is dropped. As fast as the sand settles it is removed by a boy or man who pulls it up the slanting side with a broad bladed hoe. He holds it for a few seconds to allow the sand to drain and then pulls the sand off the edge to fall in a pile below.

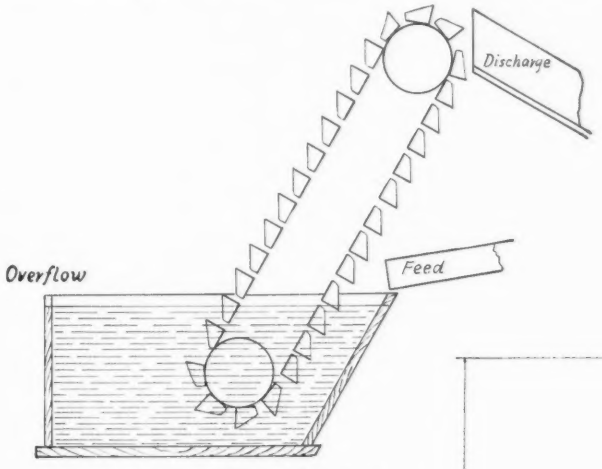


Fig. 14—Dewatering elevator

In the mechanical form the "man with a hoe" is replaced by some excavating apparatus, such as drags, screws or lifting blades. One form, in use several years ago, used a pair of shovels that had much the same motions that a man would make if he were shoveling sand out of a trough. But simpler and less complicated forms have been found to do better work.

The great advantage of this class of machines is that they discharge the settled product at a higher elevation than that at which the feed enters. This saves head room, which is often an important matter in plants which have a "gravity" flow sheet, and which avoid as much as possible the use of elevators. However, the advantage has to be paid for. The elevation of the pulp takes power, whether it is done by the settling device or by an elevator. Some forms of this class are very serious consumers of power. And repair bills are also heavy, as compared with the quicksand machines described in the previous article.

Comparison with Quicksand Devices

All the quicksand machines give a product containing about the same percentage of moisture, that is to say, from twenty-five to thirty per cent on sands having the same specific gravity as quartz sand. The class under consideration shows a wide variation in the dryness of the settled product after it has been removed.

The screw machines may be made to give a very dry product, so dry that only some type of centrifugal separator can excel it in that respect. But it is possible to make a very wet product with a screw, and sometimes this has to be done to get capacity or to avoid the loss of fines. Drag belts are apt to give a "sloppy" product unless they are run slowly and unless they bring the sand out on rather a steep angle, which means lower capacity. The most successful machines are those which hold the product for an instant on the sloping discharge surface to allow the water to drain away from the sand, and these also give the cleanest product as regards the clay content.

Dewatering Elevator

Perhaps the simplest form of this class of machines is the dewatering elevator shown in Fig. 14. It is a machine well adapted for handling coarse material, but it does not do very well for fines, as these escape through the drainage holes in the bottom of the bucket. To overcome this difficulty dewatering elevators have been made with flat plates like the flights on a drag belt. The sand settles on these plates and the water runs off the sides and ends. This type of elevator has not been very

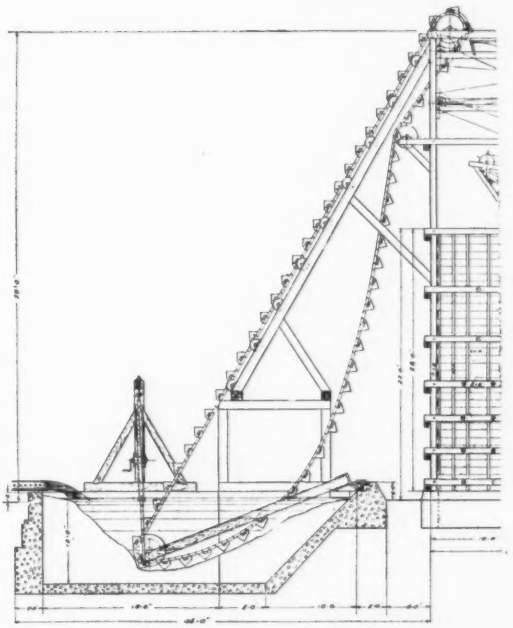


Fig. 15—Application of the dewatering elevator

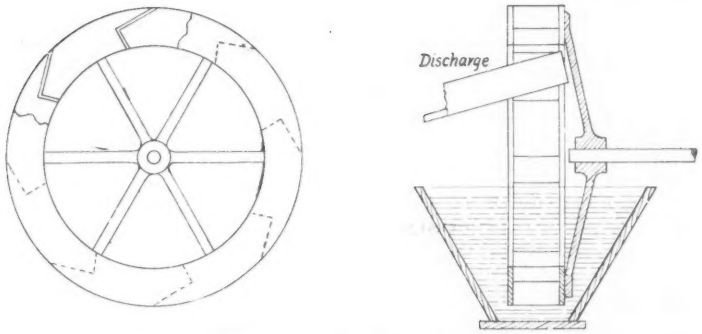


Fig. 16—Vertical sand wheel or shovel wheel

successful as its capacity is very low.

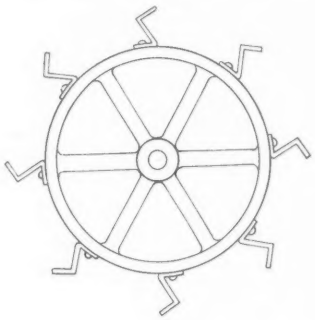
The dewatering elevator with perforated buckets may be considered an alternative for the dewatering screen, with the advantage it elevates the product at the same time that it dewaters the product. A typical use of this machine is to be found in coal washers, where it is used to dewater the washed coal from the jigs, which is from ¾ to ⅛-in. in size. The fine coal which escapes through the perforations of the buckets and is carried out with the overflow is caught in some kind of settler, usually of one of the types described under "Sand Collectors." At one of the coal washers near Birmingham, Ala., a very large quicksand cone, forty feet in diameter, is used for catching the fine coal in the overflow of the dewatering elevators.

It is usual to make dewatering elevators so that they are inclined from the vertical. This is to aid in the discharge for they have to be run slower than the ordinary bucket and belt elevator to allow time for drainage. For low capacities the buckets may be set at wide intervals, and if this is done the discharge from the bucket passing over the head pulley will not fall upon the bucket below, and wear it out. But in the case of material which tends to stick in the buckets it is better to have the discharge strike on the bucket below to loosen fines that hang in the corners, and to do this the buckets are spaced very closely.

In washing phosphate rock dewatering elevators are generally used to handle the "lump rock," which may run from two inches in diameter down to the size of sand. Sometimes sprays are placed at one side of the elevator and set to throw clear water, with considerable force, on the bucket of lump rock as it passes.

Sand Wheels

Sand wheels, or "shovel wheels," as they are also called are made in a number of forms. Fig. 16 shows a vertical form and Fig. 17 an inclined form. This inclined form has been considerably used in ore milling. It has the advantage of requiring very little head room, and it does not require so much power as the vertical type because it does not lift the settled product so high.



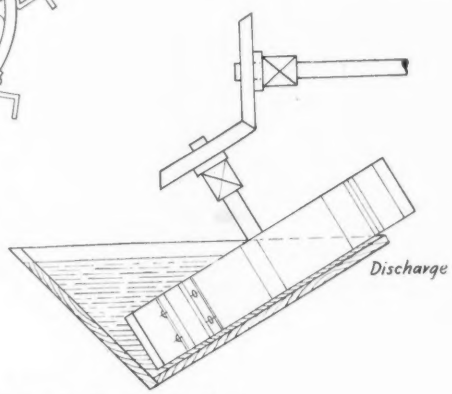


Fig. 17—Inclined sand wheel

Very large sand wheels with perforated buckets have been made as substitutes for dewatering elevators. About fifteen years ago "tailings wheels" or "raft wheels" as they were sometimes called were considerably employed in the place of elevators, but as they have all passed out of use it may be concluded that they were not successes.

The smaller wheels, such as are shown here, do not usually have perforated buckets and depend on the water draining off the sands, as the wheel revolves, so that a comparatively dry product is brought to the discharge point.

Washing Cans

The shovel wheels, or sand wheels, illustrated, run in a stationary box which is the settling part of the apparatus. By changing this box to a cylinder and putting the lifters, or shovels, on the inside we have a type of machine which goes under various names, of which "washing can" seems the most descriptive. It is largely used for washing iron ore, phosphate rock and to a limited extent for washing building sand and gravel. It is generally thought of as a washer, that is a machine for cleaning sand or ore by attrition and the friction of the particles as they roll or slide upon each other. It does this work, but it also acts as a settler, the area of the pool in the can and the amount of water fed determining the size of particles which settle instead of going out with the overflow.

Fig. 18 represents a washing can, the half section at the end showing the arrangement of lifting blade by which the settled product is discharged. It is usual to run the discharge out through a cylindrical screen that turns with the can. A spray in this screen gives the contents a rinsing that removes the adhering clay.

Washing cans have about the same use as log washers which will be described with the screen machines, to which class they belong. As cleansers both have the advantage of scouring the rock, but in the writer's opinion the log washer is rather more effective in washing off the lumps of hard clay that give so much trouble in the Florida phosphate field, for example. The washing can generally has a larger settling area than the log washer and for that reason will send finer sand to the discharge.

(To be continued)

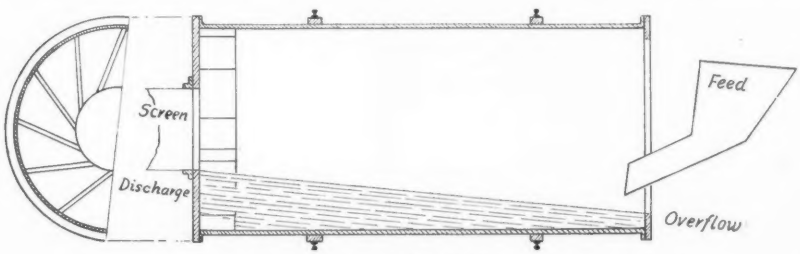


Fig. 18—Washing can

The Automatic Rotary-Grate Shaft Kiln

How European Portland Cement Manufacturers Are Meeting Rapidly Increasing Fuel and Labor Costs

By C. F. Hansen, M. E.

Formerly Consulting Engineer, Kristiania, Norway. Present Address: 61 Palmer Lane, Larchmont, N. Y.

FROM MY OBSERVATION it would seem the fact that the old upright shaft kiln has been modernized and equipped with automatic feeding, crushing and discharging apparatus, and is now extensively used in most European countries, is not generally known to the portland cement industry of America. I have been unable to find any reference to this new system of burning cement clinker in any of the leading trade journals.

C. F. Hansen

The extensive literature on this subject published by various writers abroad, as well as the many patents filed, has, however, been called to the attention of at least two leading cement manufacturers in this country, with whom I have had the pleasure of corresponding. The editor of ROCK PRODUCTS also heard of this new system and wrote to Europe for information regarding same.

In response to this inquiry I have been requested to explain the general plan of an installation of this nature to the readers of this journal and have acceded to the request, believing that the experience gained abroad, will be interesting and profitable to the portland cement producers of this country.

By Way of Introduction

My connection with portland cement manufacturing dates back to 1905, from which time on I have been constantly in touch with the industry. I spent a number of years in this country, and then returned to Europe, where I found myself confronted with a situation in many ways differing from general practice here.

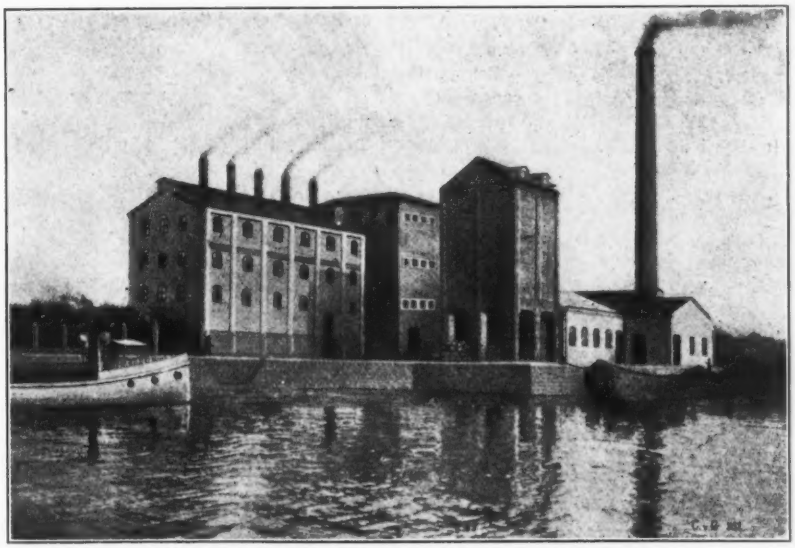
As is known to most readers, in the early days all cement was burned in upright kilns; then the rotary kiln was developed in America and gradually reached the present degree of efficiency. The old shaft kiln produced cement clinker with a minimum fuel expense, but the quality was not uniform due to the fact that the feeding and discharging had to be done by hand. The high labor cost and comparatively low price of fuel in the United States resulted in a speedy and general adoption of the rotary kiln here to such an extent that it is doubtful if a single shaft kiln is in operation for the manufacture of portland cement at the present time in the United States.

History of the Improved Shaft Kiln

Europe, however, was not so quick to adopt the new invention and large numbers of shaft kilns were still in operation as late as 1913, and new ones were being erected in various places. At that time the writer was privileged to visit a district in Southern Hungary, now belonging to the new state of the Jugo-Slavs. For several years the manager of a well-known large cement factory there had been experimenting with an automatic crushing and discharging device and had attached this to several of his upright shaft kilns of the "Schneider" type.

The introduction of air into these kilns by forced draft had been accomplished previously with the result that the capacity of 8 ft. diameter kilns had been more than doubled and was said to range as high as 200 barrels of clinker in 24 hours. It was quite clear that if one of these kilns could be fed and discharged continuously, and the burning zone could be held constantly at its proper height, the percentage of underburnt clinker, which had generally affected the quality before, could be reduced to practically zero.

It was essential to the future success of this concern that the quality should be improved in order to successfully compete with the newer firms operating under the wet process with rotary kilns, and

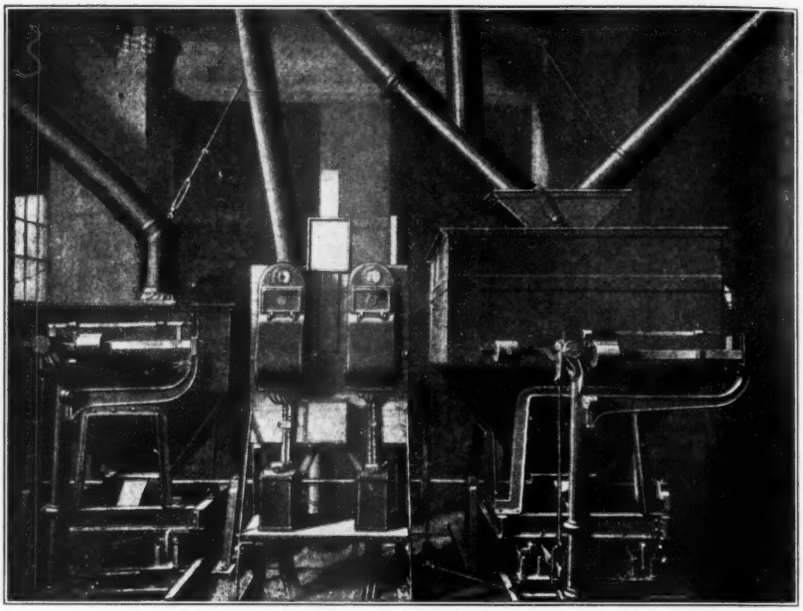


Cement plant with five rotary grate kilns. Capacity 1500 bbls. per day

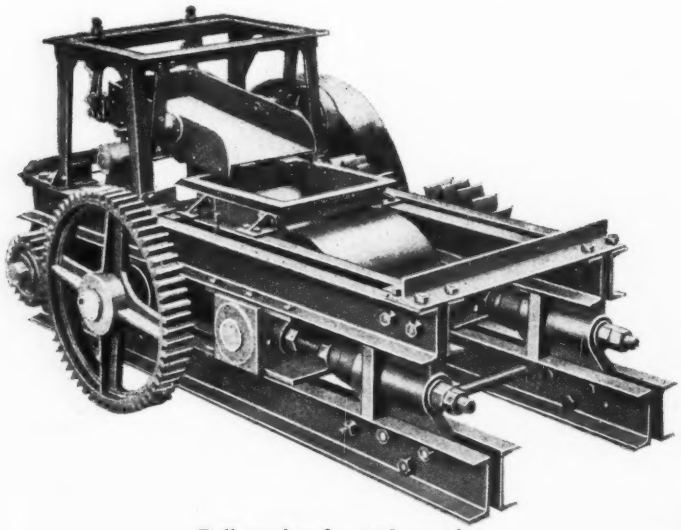
who in addition made it a practice to grind both raw material and clinker to the highest possible degree of fineness, thereby obtaining crushing and tensile strengths of cement previously unknown. This, of course could only be accomplished at enormous expense in heat units and horse-power.

Most specialists do not support such practice and have realized from the beginning that the manufacturing cost must be kept within certain limits and that the greatest economy must prevail throughout the whole manufacturing process. Competition must be met and the product be of such a quality as to give general satisfaction in practice and range well above the specification for strength.

I was greatly impressed by the results obtained in Southern Hungary and became thoroughly convinced that these people had succeeded in solving a very difficult problem. The idea of combining the advantages of the economical shaft kiln as to fuel consumption with those of the rotary kiln as to quality and continuous production, had in my judgment been accomplished. Mechanically, I found that the apparatus could be greatly improved on, but that the principle was basically sound and practical.



Scales for weighing the raw materials



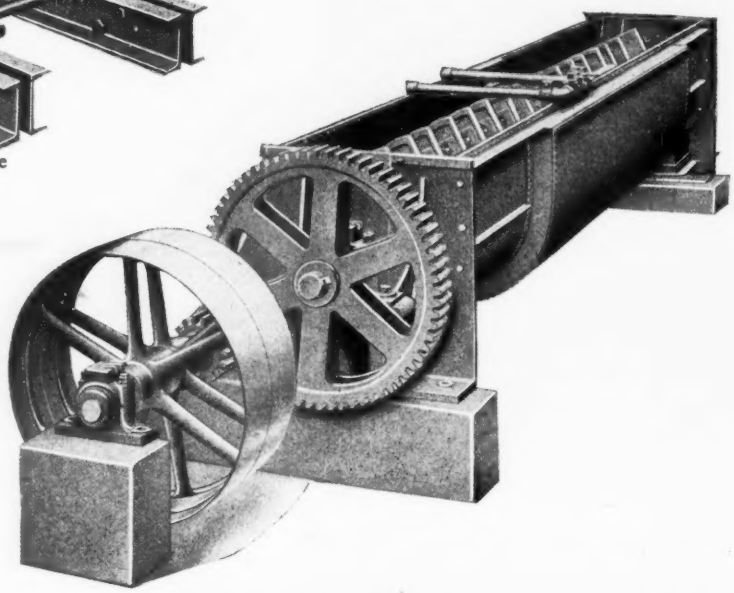
Roll crusher for coal or coke

Germany Takes Up Improvement of Shaft Kiln

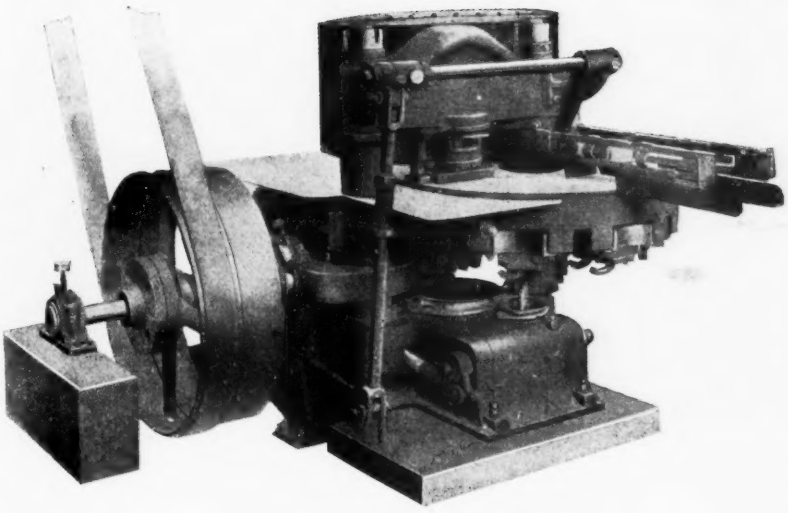
As a further result of my investigations, a contract was finally signed between the Hungarian inventors and Curt von Grueber, Berlin, Bellevuestrasse 6, a manufacturer of cement-making machinery, known all over Europe as the successful foreign representative of the Kent Mill Co., of New York. Grueber acquired the sole manufacturing and sales-rights for the entire world and in conjunction with the writer re-designed and put these kilns on the market at the beginning of 1914.

The first order for two kilns was placed by a cement factory in Poland a little later, and when the world war started in the middle of 1914, the automatic shaft kiln had already been recognized by experts to have exceeded the most optimistic ideas of cheap clinker production, and between 30 or 40 kilns were then already installed or in course of construction in Russia, Poland, Italy, Austria, Sweden, England and Germany.

Since then the rotary-grate shaft kiln has been further developed and is today employed on a large scale and recognized



Mixer for raw material fuel and water



Briquetting press

as the most important and fundamental improvement in the entire European portland cement industry. The introduction of this kiln has changed the entire situation in the previously expensive manufacturing and the extraordinary application of this new system is now a fact that must be figured with, not only in Europe, but in all other parts of the world, where it is essential to reduce the fuel cost, which is the most important factor in the manufacture of a barrel of cement.

Superior Economy of Shaft Kilns

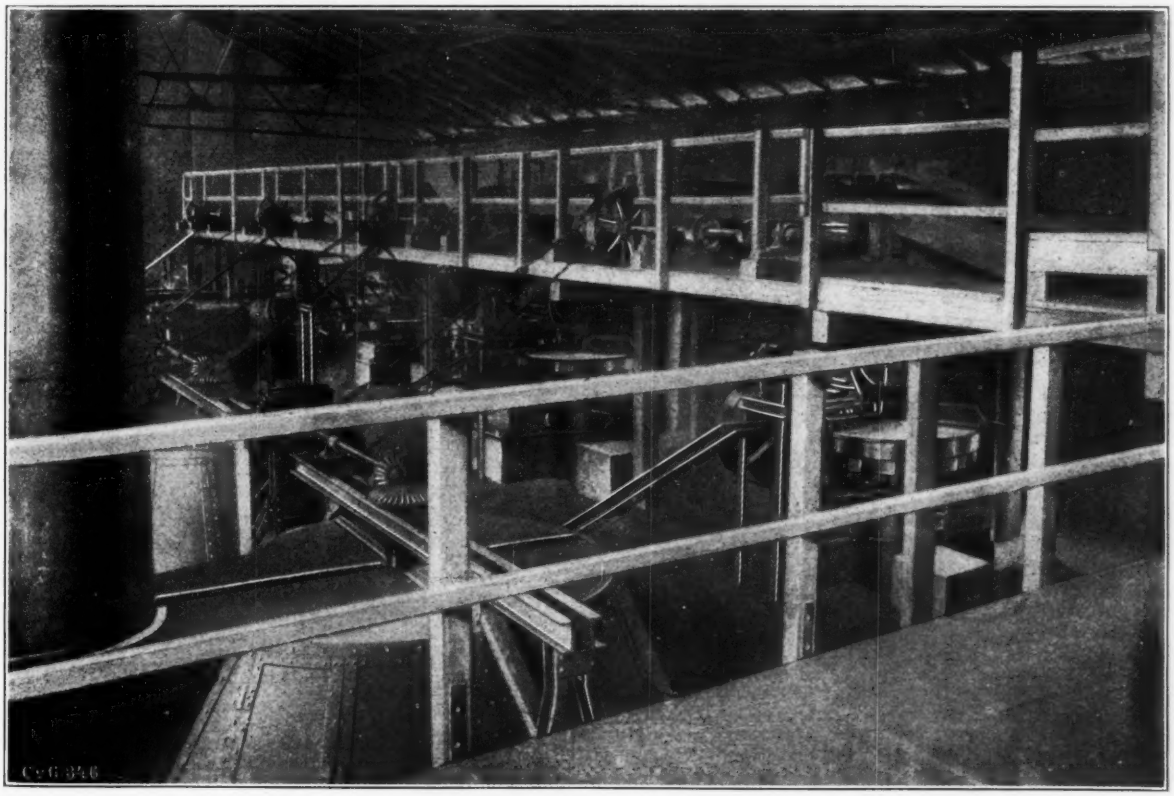
It is only necessary to point out the perfect utilization of the heat units in the rotary-grate shaft kiln to prove that it has been possible to reduce the fuel consumption to less than 50 per cent. In these kilns the air enters under pressure at the bottom, passes through the hot clinker and is thereby heated to a high temperature before entering the burning zone.

The gases from the burning zone are utilized in drying and calcining the raw material and are cool when entering the chimney. The loss of radiation, unavoidable in the rotary kiln, is almost entirely eliminated. The rotary-grate shaft kiln has already been operated with the most difficult raw materials, but it should not be overlooked that careful study and treatment of the raw materials is just as important as with any other system and probably more so.

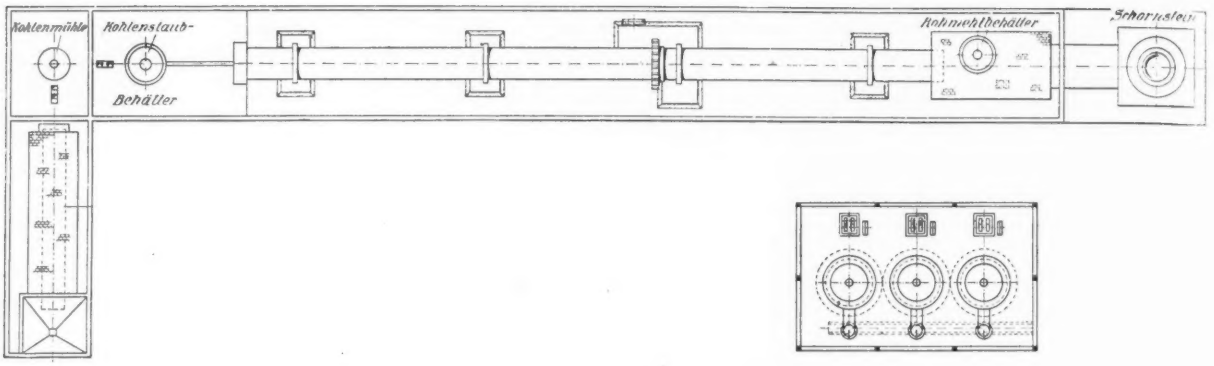
Preparation of the Raw Material

Crushing, drying, mixing and grinding can be done in the same manner as heretofore with any kind of suitable machinery, but it should always be borne in mind that the more carefully the raw materials are weighed, mixed and ground, that the more perfect the clinker will be. To accomplish this, the necessary bins and apparatus with their conveying system should be provided for.

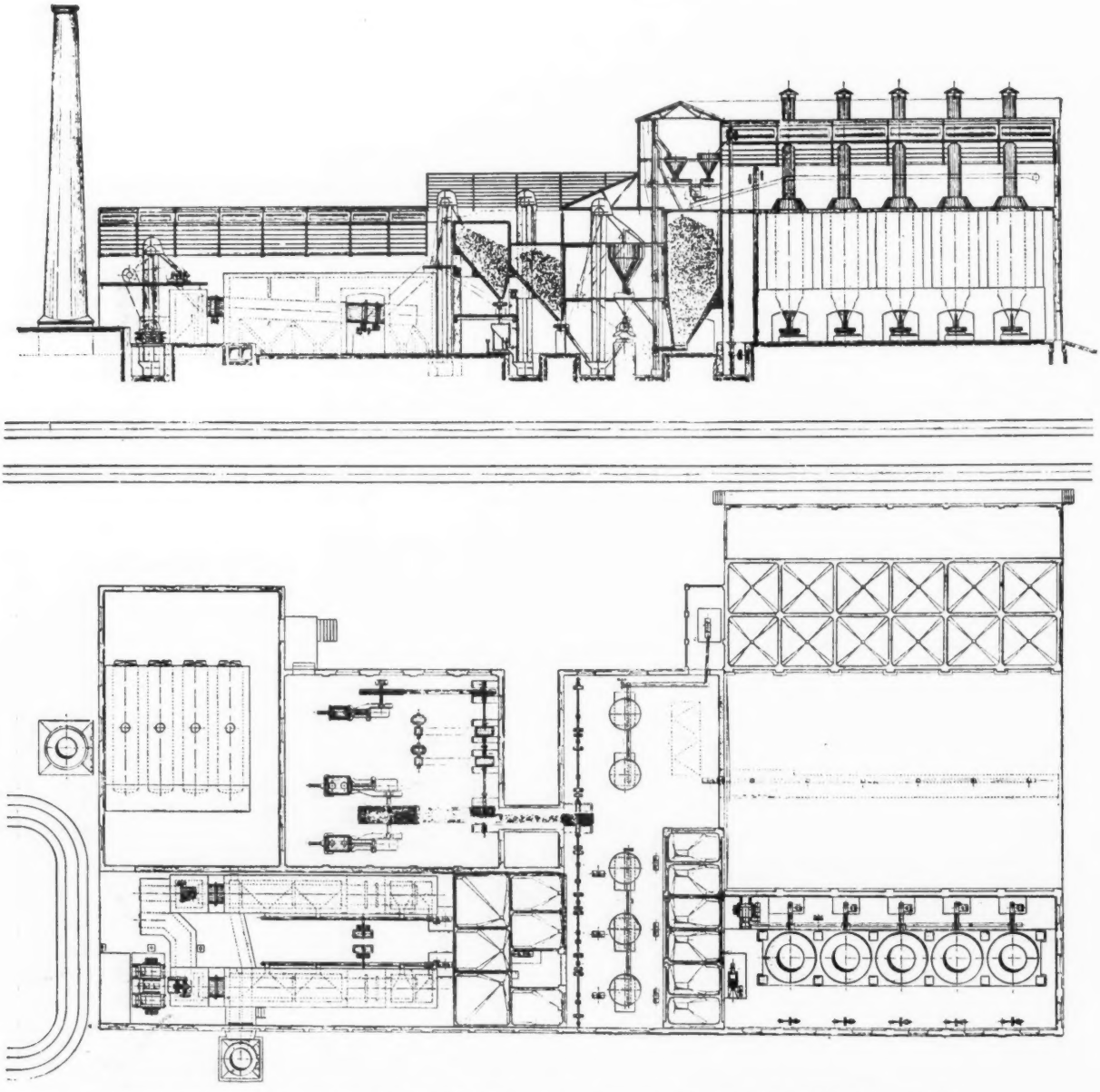
Generally the raw material is conveyed from the finishing raw mills into large feed bins placed in front of the kiln building. In these bins it is analyzed and any difference in the mix is corrected by mixing the contents of two or more cells, so as to give a complete uniformity.



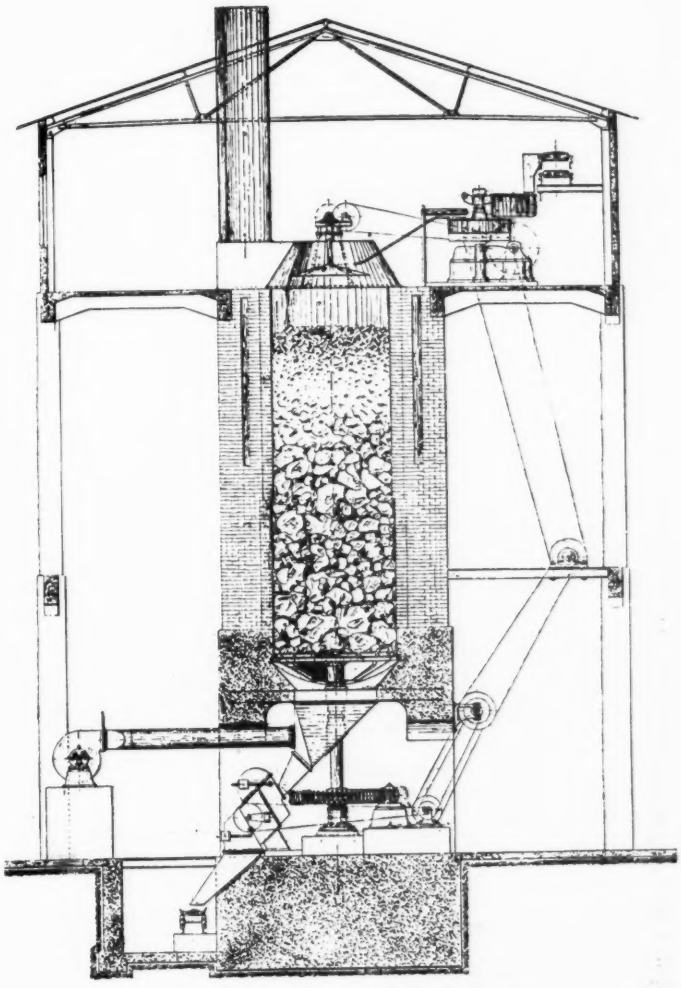
View showing top floor with presses and kiln hoods



This cut shows the floor space required for a three-kiln rotary grate kiln plant in comparison with a rotary kiln installation of the same capacity of approximately 1000 bbls. per day



Cross section and plan view of a five-kiln rotary grate cement mill. Capacity 1500 bbls. per day



Section through rotary grate shaft kiln

As for fuel, coal, coke and even the cheapest kind of screenings can be used to advantage. Gas can also be utilized as fuel and probably also crude oil, although no experiment has as yet been carried on to ascertain this.

In using coal or coke, which should be crushed down to pea size, it should be mixed with the raw material for the cement before briquetting. In this way a close mixture and uniform distribution of the fuel is assured. At this stage about 10 per cent of water is added in order to make the "mix" sufficiently moist or plastic for the briquetting process.

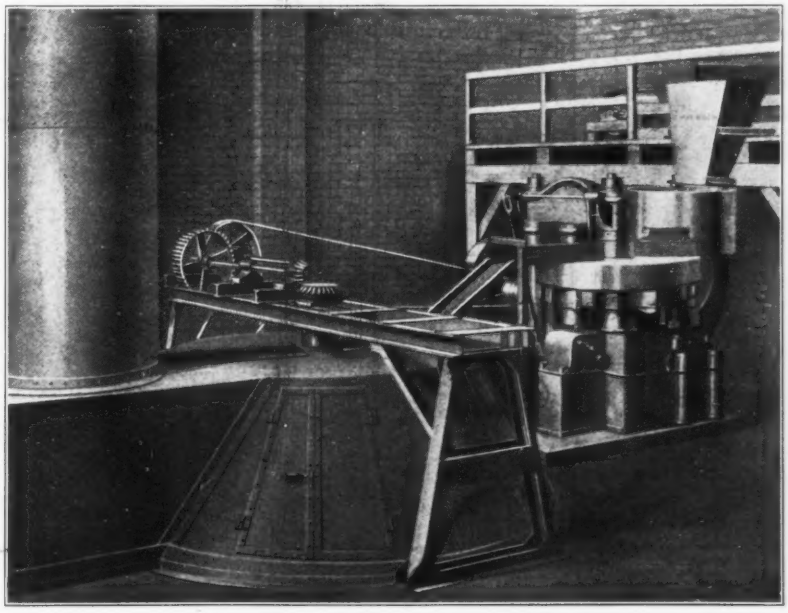
Each kiln has its own briquetting press on the top, placed in such a way that it can be readily fed with the raw material, fuel and water, from a steel band conveyor. The presses used in Europe in this connection are mostly of the rotary table type. The briquettes vary in size, but should not be larger than ordinary common red building bricks. From the presses the briquettes are automatically discharged on a revolving table of special construction inside the rotary grate shaft kilns and evenly distributed on the top surface.

The fact that the raw material must be pressed into briquettes, is a slight disadvantage of this system, but this is more than compensated for by the elimination of a coal pulverizing plant. Every practical cement man is familiar with the trouble and expense of running a coal mill with its crushers, dryers, grinding mills and conveyors, which is a relatively expensive proposition in comparison to the automatic and cheap operation of these presses. The speed of the presses can be regulated so that they serve as automatic feeders for the kilns, turning out the exact number of briquettes required by the kiln.

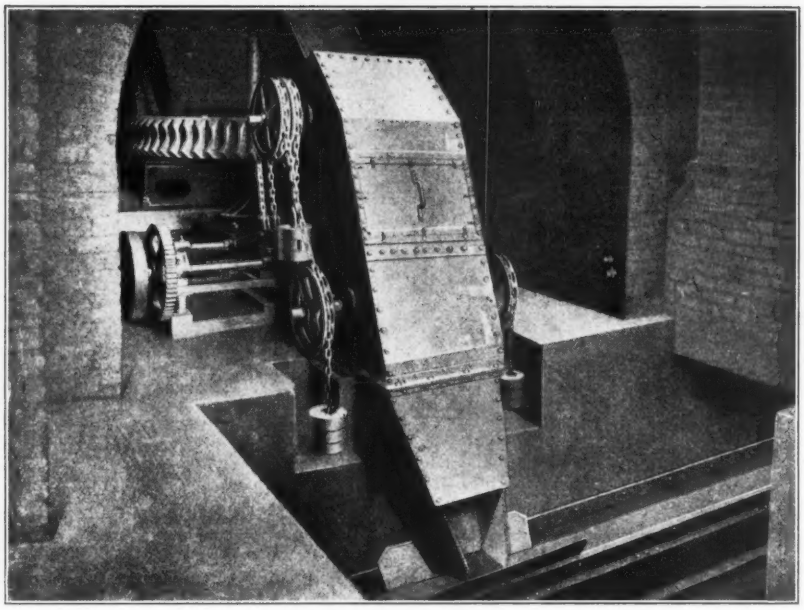
The right proportioning of raw material, fuel and water is very important and special machinery has been designed for this purpose. Raw material and crushed coal or coke is elevated into separate bins and discharged into the mixer by means of adjustable, variable speed feeders, which are set by the chemist according to the requirements in the burning process. Then the water is added and after a thorough mixing the material is ready for the presses.

The exact shape of the briquettes is of no importance as long as they are hard enough to slide down the incline from the presses and stand a fall of about 2 to 3 ft. inside the kiln without disintegrating, thereby allowing the compressed air to find its way through the kiln. Not all raw materials can be formed into briquettes of sufficient strength and practical tests are therefore always performed before any guaranties are given as to the quality of the finished cement.

Such presses as used in the sand-lime



Automatic feeding arrangement of kilns



Automatic discharge of kilns

brick industry are mostly adapted. In many cases a partition is placed in each form, reducing the size of the briquettes to one-half of an ordinary brick. This form has given good results in practice. Round or eggshaped briquettes would be ideal, but many experiments have shown that these shapes are very difficult to form in the presses designed for that purpose.

The kilns are started with a fire of wood and old clinker in the same manner as customary in upright kilns.

The presses are then put in operation and the briquettes distributed over the surface as fast as experience will allow. The burning process soon becomes normal and the kilns then work automatically and continuously. A great advantage is that the kilns can be shut down for several days by closing off the draft and then started up again without any difficulty. For this reason many manufacturers make it a practice to shut down the whole plant over Sunday and holidays during slack times.

The burning process itself has some likeness with the one introduced by Schneider, insofar as the lining even in the burning zone is affected very little by the heat and has a long life. The zone itself is very short and probably not more than 2 ft. high. The temperature required in the burning zone depends upon the raw material and varies between 1350 to 1480 deg. C.

Kiln Details

The kiln itself has generally the same dimension as the well-known Schneider shaft kiln. In place of the stationary grate, introduced by Schneider, a rotary grate is used in closing up the bottom of the shaft. This grate has openings uniformly distributed over its entire surface and is provided with teeth which cut the clinker lumps into a convenient size for further handling.

The rotation of the grate is exceedingly slow and the breaking up or crushing of the clinker is uniform over the entire surface and regulated to correspond with the feed at the top, so that the contents of the kiln will be evenly lowered. This uniformity in the discharge is of vital importance for keeping the material constantly moving at the desired speed and to assure a well-burnt uniform clinker without any under-burnt particles.

The advantageous results secured by these automatic shaft kilns are largely obtained by introducing air under pressure at the bottom of the kiln, each kiln being provided with an adjustable fan of solid construction to regulate the air feed, in conformity with the burning process.

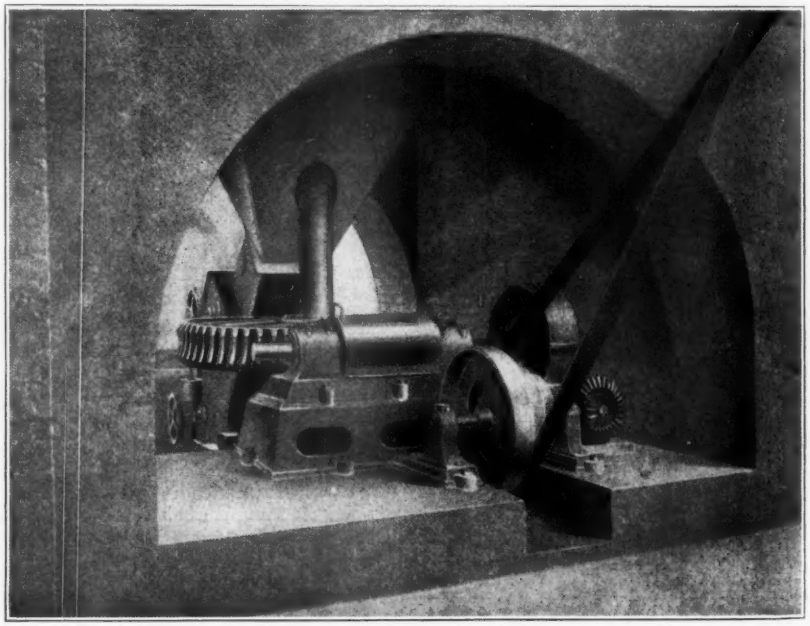
The capacity of the rotary grate shaft kiln depends necessarily on its size, and by experience an interior diameter of 8 ft. has proved to give the best results in every respect with an output of about 300 bbls. of well-burnt clinker in a continuous 24-hour run, although I recall many cases from my own observation, in which much larger outputs have been obtained.

For the operation of a three-kiln plant with a conservative yearly capacity of about 300,000 bbls., only two men are needed, one as burner for supervising the work of the kilns, the other for the automatically-working briquetting presses.

The horse-power of the entire plant is exceedingly low in comparison with a rotary kiln of the same capacity. The rotary discharge grate takes only between 2 or 3 h.p., and with the feeding device, the briquetting press and the fan, the total horse-power does not exceed 18 h.p.

The maintenance cost is also very small and is practically limited to the relining of the kiln every few years and then mostly within the burning zone. The rotary grate itself has never shown any wear to speak of, even after several years of continuous operation, partly due to structural features, but mostly on account of the exceedingly slow rotation of the grate.

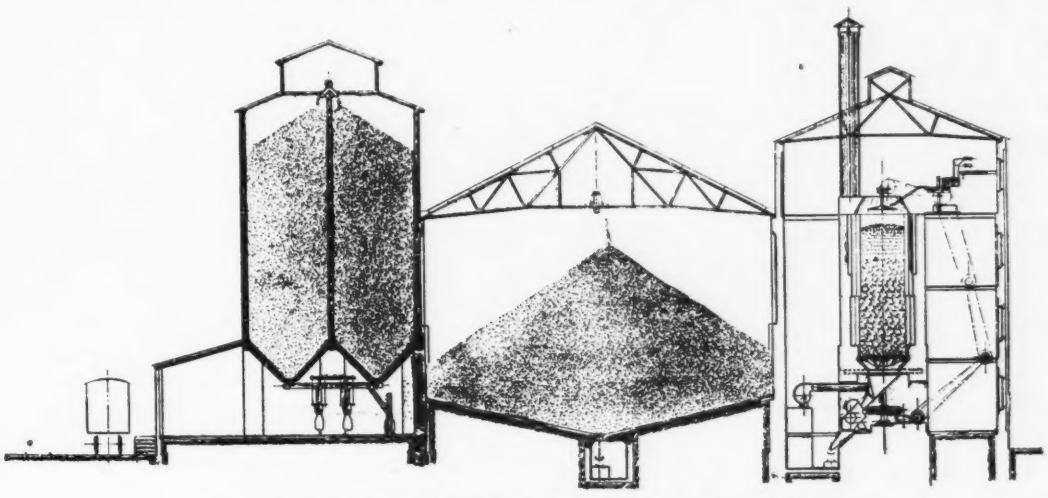
The quality of automatic shaft kiln cement in no way differs from the best ro-



Driving arrangement of rotary grate

tary kiln cement under equal conditions of the raw material owing to the perfectly uniform burning process.

The consumption of fuel varies slightly according to the raw material, but on the average the heat consumed in the burning process amounts to between 40,000 and 45,000 calories per hundred pounds of burned clinker corresponding to less than 16 per cent of the finished product by weight. For better grades of fuel about 50 pounds per barrel of finished cement is a fair estimate.



Section through kiln building clinker storage and cement stock house

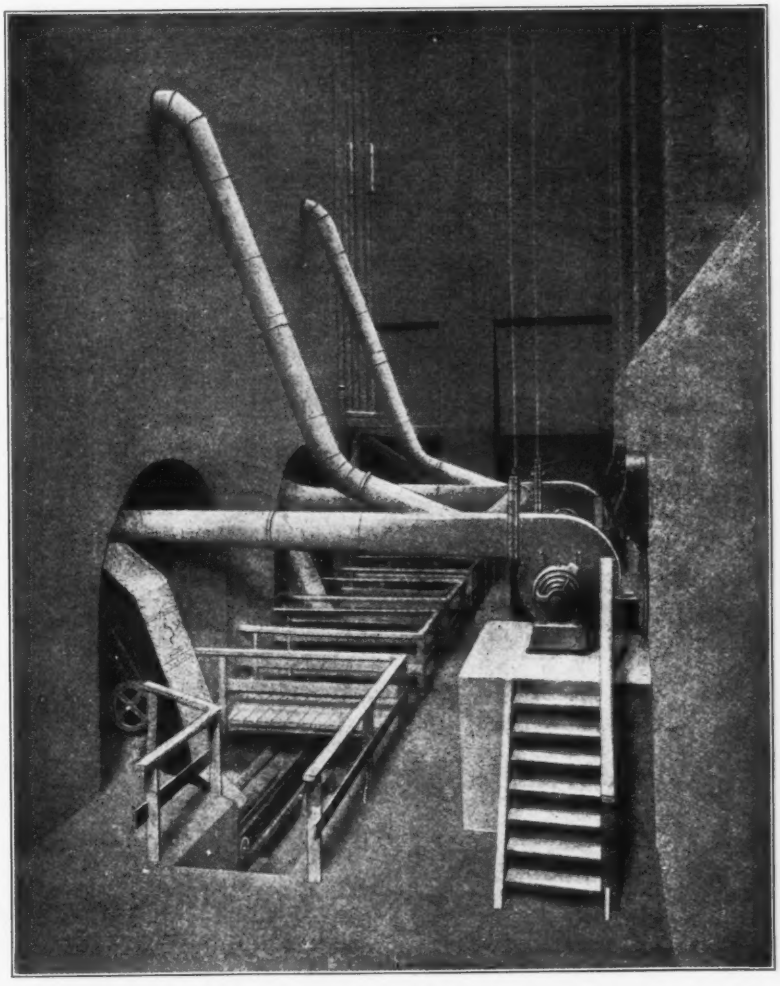
Economy of Operation

The following example may serve to illustrate the great savings which are obtained in a rotary grate shaft kiln plant in comparison with one operating with rotary kilns. The calculation is based on the conditions prevailing in the early part of 1914 on the European continent, and I have not revised them, owing to the varying conditions and prices prevailing at present, which do not give a sufficiently stable foundation, but these figures can, of course, be easily converted by such additions or such factors as correspond with the increased prices of the present time.

Assuming a yearly output of 300,000 bbls. of cement, the saving in fuel alone amounts to 7,200 tons. With a coal price of $5 per ton this would mean a saving per annum of $36,000

The power required for a three-kiln rotary grate installation would be about 36 h.p., while a corresponding kiln plant with cooler, coal dryer, coal mill and auxiliary apparatus takes at least 140 h.p., a saving of 110 h.p. or a total of 2,640 h.p. hours at one cent is equal to $26.40, or for 300 working-days per annum..... $ 7,920

The initial cost of such a plant, consisting of three rotary grate shaft kilns is about 40 per cent less than the cost of a rotary plant of the same capacity, with coal-mill and coal dryer. In addition thereto a very considerable saving in space and building (as shown in one of the illustrations) must be calculated, the space required being only about one-fifth of that for a rotary kiln plant. This alone means a saving of 60 per cent.



Arrangement of variable speed blowers

The initial cost would be thus reduced by about $30,000, and on the basis of 10 per cent amortization may be calculated a yearly saving of ..... $ 3,000

As mentioned before the capacity of the clinker mill would be about 35 per cent higher in grinding rotary-grate shaft kiln clinker in comparison with rotary kiln clinker, thus reducing this part of the installation to about two-thirds of the grinding apparatus. For grinding 300,000 bbls. per annum of rotary kiln clinker at least 200 h.p. would be needed, while only 135 h.p. will be necessary for the rotary-grate shaft kiln product. This saving of 65 h.p. amounts to 1,560 h.p. hours per day or $15.60, resulting in a yearly saving of..... $ 4,680

The cost of the grinding plant would be about $5,000 less and figuring on only 15 per cent for interest, depreciation and repairs a further annual saving would result of about ..... $ 750

The repair account of a rotary-grate shaft kiln being limited principally to the relining of the short burning zone about every two years is consequently very small, while the relining of the rotary kiln in the burning zone would have to be done about twice a year and this expense on a close and conservative estimate would be at least $900, as against $120 for the rotary-grate shaft kiln plant, resulting in a yearly saving of..... $ 780

The power station would be reduced by 110 h.p. plus 65 h. p., equal to 175 h.p. The initial expense would therefore be reduced to about $5,000, making a yearly saving, considering again 15 per cent for interest, depreciation and repairs, of ..... $ 750

Summary

The savings in a cement plant with a yearly output of 300,000 bbls. in using rotary-grate shaft kilns instead of a rotary kiln would therefore for the kiln installation and the clinker side alone be as follows:

Fuel	$36,000
Consumption of horse-power:	
For the kiln plant	7,920
For the clinker mill	4,680
Kiln repairs	780
Initial expense in construction:	
For the kiln plant	3,000
For the finishing mill	750
For the power station	750
Total saving	$53,880

The above calculation is very conservative and based for both kiln installations upon practical experiences. Under the present state of conditions the result would be still more in favor of the rotary-grate shaft kiln plant.

It is, of course, impossible within the scope of this article to give figures that would apply to all raw materials and to the many varying conditions, but the above example shows what economy can be obtained by a well-designed rotary-grate shaft kiln plant.

Extensively Adopted Abroad

As is usual where a fundamentally new idea is brought into practical life the pioneer work of Curt von Grueber and his associates did not meet with general approval at the beginning. The manufacturers of rotary kilns attempted to discourage the development and many suits intended to hamper its further progress were filed with negative results to them.

At the highest German court the patent was declared basic and final, covering the principle of an automatic grate in connection with a shaft kiln. The system, however, in spite of some early imperfections constantly gained recognition, and today most of the leading firms manufacturing cement-making machinery in Europe, have found it necessary to bring similar kilns on the market, and there exists today at least one or two independent constructions, working on the principle of a number of rolls rotating in pairs under the kilns and thereby crushing up and discharging the clinker.

The majority of the manufacturers have now adopted the Grueber system and have acquired special licenses for the use of the rotary grate, and are applying more or less distinct minor features of their own.

Since the first experiments were started in Hungary, about 10 years ago, many improvements on all essential mechanical devices have been made, and staffs of engineers are constantly working to increase, if possible, the efficiency of the apparatus.

Years have elapsed since the time when we used 60-ft. rotary kilns in this country, and these kilns have in the meantime been lengthened and made larger in diameter up to the huge monsters of today. During this development I have been impressed by the great production of 1,000 barrels or more a day for one kiln and as a saving in fuel could not be accomplished to any extent, I considered a greater output of vital importance. In this respect I have changed my mind.

A cement mill with a dozen or more rotary kilns of the largest size, has such a tremendous production that the radius of distribution becomes too large. Freight rates are now more vital factors in the determination of the selling price of a barrel of cement to the user than ever before. Comparatively small mills with from 3 to 6 shaft kilns, making from 1,000 to 2,000 barrels of cement per day at the lowest possible cost and distributing the cement in their immediate vicinity, will be able to sell their product cheaper and still make a larger profit.

The time has come to eliminate all waste and to cut down the cost of production wherever possible, and in this respect the European nations, forced by necessity, are already accomplishing results, an example of which I have given in this article.

[**Editor's Note**—The investigations and conclusions of the author expressed in the foregoing have been submitted to a number of authorities in the cement manufacturing field, and a symposium of their opinions and experiences in this regard will appear in a later issue of Rock Products.]

Death of A. H. Lauman, Jr.

THE LIME INDUSTRY has lost one of its rising generation in the recent death of A. H. Lauman, Jr., son of A. H. Lauman, president of the National Mortar and Supply Co., Pittsburgh, Pa. Young Mr. Lauman (he was 32 years old) had been his father's right-hand man in the operating end of his lime business and already had made a wide and agreeable acquaintance in the industry.

He was educated in engineering at Cornell University and followed his father's footsteps in learning the lime industry from the ground up. At the time of his death he had practical oversight of the operations of the lime plants at Gibsonburg and Springfield, Ohio.

A. H. Lauman, Jr.

Rock Products joins the entire lime industry in extending to the father, A. H. Lauman, its sincere sympathy. Mr. Lauman is the treasurer of the National Lime Association and has for many years been one of the foremost figures in the industry.

Editorial Comment

Trade Associations

Secretary of Commerce Hoover and Attorney-General Daugherty have been conferring recently on ways and means of keeping trade associations on the right track. Both of them are broad-minded, liberal business men. Mr. Hoover, particularly, having served as president of an association of mining engineers, realizes the good these associations can do and are doing for their respective industries. He is anxious for close co-operation between the government and business, and he knows it can be brought about only through national organizations of business men—trade associations.

It is probable some means will be found to remove the uncertainty now existing as to just how far these trade associations can go without violating the Sherman law. The attorney general, who has suits pending against various building material producers' associations, including the portland cement manufacturers, is quoted as having said recently:

> The Department of Commerce is much concerned about the welfare of business. Mr. Hoover and myself have discussed the situation and we both are anxious to give business reasonable assurance that it will not be disturbed by Government action or legal interference. There are a great number of trade associations and organizations of business that are of much benefit to business in general. The majority of these organizations are desirous of doing the right thing. There are, however, some which, under guise of trade associations, go beyond the point permitted by law.
>
> Prices are fixed in an illegitimate way and illegal things are done and camouflaged. Representatives of several organizations have come into the department and agreed to work in harmony and quit what might seem to be questionable practices. I want to say, of course, that in taking this matter up and discussing it directly with representatives of the organizations should not lead to the conclusion that the Department of Justice will close its eyes to violations of the law. The administration wants to start right in dealing with business and believes that the present is the time to make the start.

Freight-Rate Progress

Elsewhere in this issue is a brief note based on a publicity item issued by the Association of Railway Executives, in which it is stated that while total car loadings (all commodities) for the seven weeks ending July 16 decreased a considerable amount, car loadings of sand, gravel and stone increased about 33⅓ per cent.

The circular then goes on to state:

> The traffic executives of the railroads feel that these figures clearly indicate that the movement of these two classes of commodities [one referred to is grain—editor] has not been retarded and does not require stimulation.
>
> With regard to road building materials, this is characteristically a local or short haul business. The character of the traffic practically precludes its consideration from a national standpoint.
>
> Representatives of the railroads conferred with representatives of road building materials in Washington in June, and gave assurance of their willingness to reconsider and readjust rates in particular instances where the situations were found to justify such readjustment. In accordance with this assurance, readjustments in the rates on road building materials are being made where the special circumstances make it equitable.

It is presumed the figures given above cannot be successfully disputed, so that the argument used by the railway men would have considerable weight at a hearing before the Interstate Commerce Commission. It is probable that the producers of mineral aggregate will soon take their case to the commission as a national issue; and to be fore-warned is to be fore-armed.

In the meantime individual producers should see to it that the railway men's claim of taking care of local cases is justified by practice.

The New Shaft Kiln?

Will a steadily diminishing fuel supply and increasing labor costs, and higher freight rates on distribution lead to decentralizing the cement industry in this country? How can the cement industry effect further economies in production costs? Is the continuous discharge, automatically tended shaft kiln, developed in Europe, the key to the solution of these problems? These are questions possibly no one could answer accurately at this time.

Rock Products has asked a few leaders in the American portland cement industry for their opinions. A few of them had already given this process considerable study. The superior fuel efficiency of these shaft kilns is unquestionable, but the problems of their operation to produce the highest quality of cement have not all been solved—such is the verdict of American manufacturers.

Our American portland cement manufacturers perfected the rotary kiln process and in no other country has the industry reached the proportions attained here. Yet it has long been recognized that the industry was a wasteful one so far as fuel was concerned.

Our fuel resources are, indeed, tremendous, but not unlimited. For many years we have been living on the cream of our coal deposits, and costs of coal production are constantly increasing and will continue to increase as the most accessible coal is used up.

Eventually the item of fuel costs will govern, and American manufacturers will likely have to decide whether it is more economical to waste heat in the kiln and recover it for use under boilers, or utilize all the heat in burning the clinker; for it seems certain that American manufacturers and machinery builders can and will eliminate the shortcomings in the shaft-kiln process and perfect it as they have perfected the rotary kiln process.

Accident Prevention

The Design and Construction of Safeguards

By SIDNEY J. WILLIAMS
Secretary and Chief Engineer, National Safety Council

A RAILING USED to guard machinery or floor openings, or on platforms or stairways, should be at least 3½ feet high and should have an intermediate rail midway between top rail and floor. If used around a flywheel pit, floor opening, platform, etc., it should be equipped with a toe-board. Railings should be provided on all open sides of stairways, platforms, etc.; on at least one side of enclosed stairways not more than 3½ feet wide; on both sides of stairways over 3½ feet wide; on both sides and in center of stairways over 7 feet wide.

Ladders

Ladders are a good example of plant equipment, other than machinery, which requires to be safeguarded. The ladder itself must be strong enough to carry as many men as may ever go on it at one time, with a factor of safety of at least two. Home-made ladders require especial attention because they are likely to be poorly put together or to contain defective material. Portable ladders should be equipped with anti-slip bases of a type suited to the floor on which the ladder is used; for rough wood floors, metal points or lead-coated bases; for concrete floors, lead or carborundum. For some kinds of floors, such as iron or wet concrete, it is almost impossible to find a ladder shoe which will not sometimes slip. In such cases, the only safe practice is to station an attendant at the foot of the ladder, or to lash the ladder at top or bottom or both.

Stationary ladders should have proper clearance on all sides—8 to 12 inches in the back, 24 to 36 inches in front, 15 inches on each side of the center line of the ladder. For vertical ladders, especially if of considerable height, an enclosure or back-rest is desirable.

THE DESIGN AND CONSTRUCTION OF SAFEGUARDS

Summary

1—THE NEED OF SAFEGUARDS
- (a) Machine accidents are more serious;
- (b) Proper guards do not decrease production—may increase it.

2—CHARACTERISTICS OF AN EFFICIENT SAFEGUARD
- (a) Must prevent all possible accidents;
- (b) Must not interefere with production;
- (c) Should be attached to machine, where possible;
- (d) Must permit easy oiling, inspection, and repair;
- (e) Must permit cleaning and sweeping around machine;
- (f) Must be substantially built;
- (g) Should be incombustible;
- (h) Should be interlocked with operating mechanism, where practicable.

3—TYPICAL TRANSMISSION SAFEGUARDS
- (a) Gear guards;
  - (1) All gears should be guarded,
  - (2) Cast-iron guards preferred,
  - (3) Complete enclosure where possible, especially if there is spoke hazard;
- (b) Belt and pulley guards;
  - (1) Horizontal belts within seven feet of floor should be guarded,
  - (2) Large overhead belts should be guarded underneath,
  - (3) Vertical and inclined belts should be guarded,
  - (4) Construction of guards.

4—TYPICAL SAFEGUARDS
- (a) Railings;
  - (1) Should be 3½ feet high,
  - (2) Should have intermediate rail,
  - (3) Should have toeboard;
- (b) Ladders;
  - (1) Must be strong enough to carry load,
  - (2) Portable ladders should have anti-slip feet.

Accidents in Trap-Rock Quarries

ACCORDING TO REPORTS received by the United States Bureau of Mines from companies operating trap-rock quarries throughout the country, the industry employed 4,951 men in 1920, an increase of 332, or about 4½ per cent, as compared with the previous year. Each employee averaged 232 working days, or a total of 1,147,480 shifts for all employees. Accidents resulted in the death of 10 men and the injury of 799, each injured workman being incapacitated for at least one day. These figures indicate a fatality rate of 2.61 and an injury rate of 208.89 per thousand men employed, based upon a standard year of 300 days, as against corresponding rates of 2.56 killed and 186.47 injured a year ago.

Men working in and about quarry pits numbered 3,369 and worked 777,262 shifts, an average of 231 shifts per man; those working outside the quarries, crushing and preparing the stone for use in concrete, railroad ballast, road work, etc., numbered 1,582 and worked 370,218 shifts, or 234 shifts per man. Accidents in and about the pits killed 5 men and injured 388, while those at the outside works killed 5 men and injured 411. The resulting accident rates per thousand men employed were 1.93 killed and 149.75 injured in the pits, and 4.05 killed and 333.06 injured at the outside plants.

New Jersey led all other states with 1,090 men employed, followed by Massachusetts with 885, Pennsylvania 752, Maryland 727, New York 631, and Connecticut 450. Nonfatal injuries were distributed as follows: Pennsylvania 194, Maryland 146, Massachusetts 121, New Jersey 114, Connecticut 92, and New York 49.

The principal causes of accidents inside the quarries were flying objects 88, falls or slides of rock or overburden 51, handling rock at face of quarry 51, haulage accidents 45, machinery 26, drilling and channeling 24, falls of persons 19, falling objects 17, and explosives 13. Accidents at the outside plants were due principally to the following causes: falling objects 17, hand tools 64, flying objects 63, machinery 55, haulage 41, falls of persons 31, and burns 16.

Of the 799 nonfatal injuries, 695 resulted in disabling the workmen from 1 to 14 days, inclusive, while 104 were of a more serious nature, incapacitating each victim for more than 14 days, and 18 of them resulted in some partial disability of a permanent character.

Review of Eastern Markets

CONSTRUCTION OPERATIONS CONTINUE to advance in the New England districts and a marked improvement in general tone has been evidenced during recent weeks. Larger work is coming to the front, particularly with respect to industrial plants of textile and shoe manufacturing character, and these are calling for sizable amounts of sand, gravel and other kindred building materials. Actual contracts awarded show good totals, with an aggregate of over $5,000,000 for the first week of the month, as compared with less than $2,500,000 in the corresponding week of a year ago.

In the Boston material market, inquiries are becoming more numerous and the same statement will hold with respect to the actual orders turned. Prices hold at existing levels with a good degree of stability, and which, in turn, is helping to inspire confidence on the part of builders and prospective builders. Materials, on the average, however, are a little higher than ordinary projects will permit, and for this reason work is being held back in some quarters in anticipation of lower levels.

Portland cement is operating under fair activity. There is a uniform demand that, while making for a featureless market, is helping to turn good allotments of material. The price holds at $3.90 a barrel, in cloth, with bag rebate of 10 cents. In paper, dealers are asking $3.75 a barrel, on the job. Mortar sand is being retailed at $2.50 a cubic yard in truckload quantities, while wholesale, the material is selling for around $2 a ton. Beach, or fine white sand, is being held at $4, delivered.

Local dealers are asking $3 a ton for crushed stone, both 1½ and ¾-inch stock. The wholesale market in this commodity is varying, with no quotations listed at the present time. Gravel is selling for $2.65 in cargo lots per ton. Common lime, in 180 and 280-lb. standard barrels, is quoted at $3.20 and $4.50, respectively, while finishing material, in the same size containers, holds at the recently established levels of $3.40 and $4.75, delivered, in the order noted.

Plaster, calcined, has declined a little from the quotations recorded in the last issue of Rock Products. In the 250-lb. barrel, the material is now priced at $5.25 instead of $5.40; and in the 320-lb. barrel the price has been reduced from $7.50 to $7.25, delivered. Sanded mortar plaster holds at $20 a ton, and fibre mortar at $24.

Portland cement maintains its level at $4 a barrel, in cloth, at Providence, R. I., with prevailing bag rebate of 7½ cents. Local dealers are asking $3.25 and $4.50 for barreled lime, in 180 and 280-lb. barrels, respectively. Hydrate lime is being retailed at 70 cents a bag of 50 lbs., and finishing hydrate at 75 cents for the 50-lb. container. Wall plaster, neat, is quoted at $24 a ton, and sanded material is bringing $21; wood fibre plaster holds at the $24 level. Mortar colors are around 4 cents a pound.

New York

New York construction activities continue to center in apartment and dwelling construction, and good calls are being made upon local dealers for building materials for this work. Brooklyn has been leading in the volume of operations until the past week, when Bronx Borough developed sort of a little construction boom all of its own, bringing about over a million dollars in new work in a few days.

There is no change in the market situation, which still has a spotty character; some dealers are enjoying a good volume of business, with increasing demand, while others complain of poor conditions in trade. The wholesale market is rather without feature, but good sized orders are being secured for early delivery in different quarters.

Prices of sand, gravel, cement and other kindred supplies are holding well at prevailing quotations, and there is noticeable stability in the figures of certain commodities. Portland cement is priced at $3 a barrel, delivered, with bag rebate holding at 10 cents. To contractors, the present figures varying from $2.60 to $2.70 a barrel, without bags, in carload lots. There is a fair call for cement and indications are for a good fall demand.

Common lime, 300-lb. barrel, holds at $4.50, while finishing material, same size container, is quoted at $4.70. Finishing hydrate, paper bags, is being sold by dealers at $24 a ton, delivered, and common hydrate, in cloth, is priced at $22.50. Current warehouse prices on lime are $16.49 for finishing material, hydrate, and around $14 for common hydrate.

Good grade gravel is selling for $4.25 in the retail market, and at $2.25 a cubic yard, wholesale, both for 1½ and ¾-inch stock. The material is operating under a fair demand, as is also building sand, which is priced at $1.80 a cubic yard at the local supply yards. In the wholesale market, sand is fetching $1.25 a cubic yard.

Crushed stone, 1½ and ¾-inch sizes, maintains at $4 a cubic yard retail, while in carload lots, wholesale, the material is priced at $2. There is a little shading in this latter figure, and a number of orders have been taken at $1.90 for immediate deliveries.

Conditions in the Lehigh Valley

The cement mills in the Lehigh Valley district of Pennsylvania are developing a sort of a normal aspect in production, although curtailed operations exist at a number of the smaller mills, and the past fortnight has not brought any material change in the situation. Orders from the rural districts have been growing less, due evidently to the fact that farmers are now giving attention to crops rather than to construction. In other channels, the demand is being well maintained, with a noticeably increased call from a number of the metropolitan centers. Road-building work continues to occupy a broad share of attention, as will be the case for some few weeks to come. Operations of this character are looming up large in Pennsylvania and New Jersey, and it is expected that road contractors will place some sizable orders at an early date.

The Atlas Portland Cement Co. is operating its large mill at Northampton, and extensive daily shipments are being made from the plant. Labor has become reconciled, evidently, to the lower wage scales that must ensue as normal conditions are reached, and no trouble has been experienced on account of the recent reduction, referred to in the last issue of Rock Products.

The Coplay Cement Co. is producing at its two mills in the Coplay section, while the Lehigh, Alpha and Giant Cement companies are also active at their different plants. With a fair amount of incoming business, there is no indication at the moment of any curtailment, either in working forces, or in plant production. Labor is plentiful in the district, and there is no difficulty in securing the desired number of men. Considerable common labor is out looking "for jobs."

Sand, Gravel and Stone Show Increased Movement

TRAFFIC EXECUTIVES, representing all parts of the United States, have finished a canvass of the situation regarding rates on grain and grain products and on sand, gravel and other road-building materials.

They find that while for the seven weeks ending July 16 the total car loadings were 976,720 less than during the same period of 1920, the loading of grain and grain products increased 67,663 cars, or nearly 30 per cent, and the loading of sand, gravel and stone increased 50,280 cars, or more than 33⅓ per cent.

New Machinery and Equipment

Revolving Crane Mounted on a Motor Truck

A FAST, NEW, PORTABLE LOCOMOTIVE-TYPE CRANE that has been exciting keen interest in various fields on account of its fitness for such work is the "Universal" crane made by the Universal Crane Co., Swetland Building, Cleveland, Ohio, whose works are at Elyria, Ohio.

This crane is built as a standard unit to mount on continuous treads, motor trucks, trailers, railroad flat cars, industrial trucks with combination wheels for ground or track travel, portal piers, etc.—anything best suited for the work it has to do. It can readily be transferred from one mounting to another, the crane supplying the lifting power when necessary.

The standard crane has a capacity of 3 to 4 tons with a 20-ft. boom. It handles a grab bucket or sling loads on the hoist block. Special equipment for dragline bucket work or dipper boom can be furnished if required. Its power is gasoline or electric and it is controlled by one man who need not be a licensed engineer.

Motor Truck Mounting

Speed of operation is very high and might best be illustrated by work the crane has done. A "Universal" crane mounted on a Mack truck working for a large sand and gravel company in Chicago unloaded a 41-yard car of sand in 28 minutes and two other full cars in 37 minutes each, it is claimed. In a sandpit for the same company the crane dug 50 full buckets and dumped them on top of the bank in 15 minutes—better than three trips a minute.

Motor-truck mounted crane in sand pit

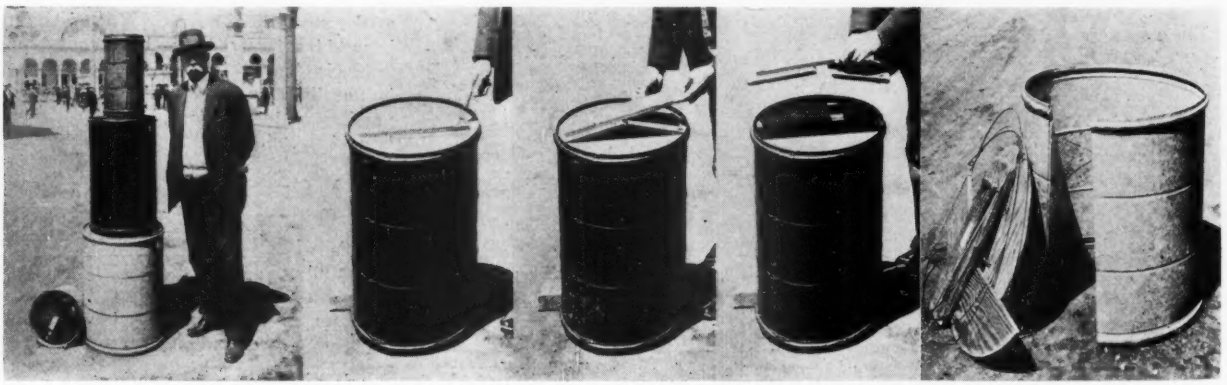
Motor-truck mounted crane handling ground storage

Knock-Down Metal Barrel

A WEST-COAST INVENTOR has just placed on the market a knock-down or collapsible barrel which is claimed to be especially applicable to the packing of such rock products as cement, lime, calcined magnesite, plaster, hydrate, etc.

The inventor is S. A. Knapp, president of the Knapp Metal Barrel and Package Co. of Nevada, 812 Hearst Building, San Francisco, Calif. The principal feature of the invention is the locking barrel head, which permits inserting (or removing) the head of a barrel in the croze without expanding the croze, or end of the barrel. This makes the metal barrel economically possible, and particularly the Knapp knock-down metal barrel, which consists of a single sheet of thin metal, cut, stamped, and fastened with wires easily detachable; the sheet, being made on machines (patents applied for), the manufacturing cost is low.

These barrels after being used to transport materials can be knocked down by cutting or opening the small tie wires holding the wire hoops—the heads and wires being placed in a barrel, the sheets being nested, and fastened with a wire for back shipment (one barrel in eight being used for heads and wires, seven sheets nested); knocked down in this way, they occupy about 30 per cent of the



Knapp knock-down metal barrel, showing various stages in opening and knocking down

space of the original shipment, and can be shipped back, and used over and over again, until worn out.

At the factory, where used, any forms damaged, or injured by denting, can be put through a set of rolls (with proper corrugations) and smoothed out, and then reassembled ready for use.

In assembling, the forms are put on a mandrel the exact size of the inside of the barrel (this mandrel being made adjustable) clamps close the sheet in place, the joint is made, wire hoops put on, and head put in, and the barrel is ready for filling.

The principle involved is the same in all classes of these barrels, the difference being only in the sizes, character and weight of metal used, thickness of heads, and depth of croze. When desired to make the barrel air and moisture-proof (it is not designed to hold liquids) a paraffined strip of cloth is inserted in the longitudinal joint when it is made, and for the most uses, the barrels should be dipped in a water- and acid-proof paint (preferably with an asphaltum base).

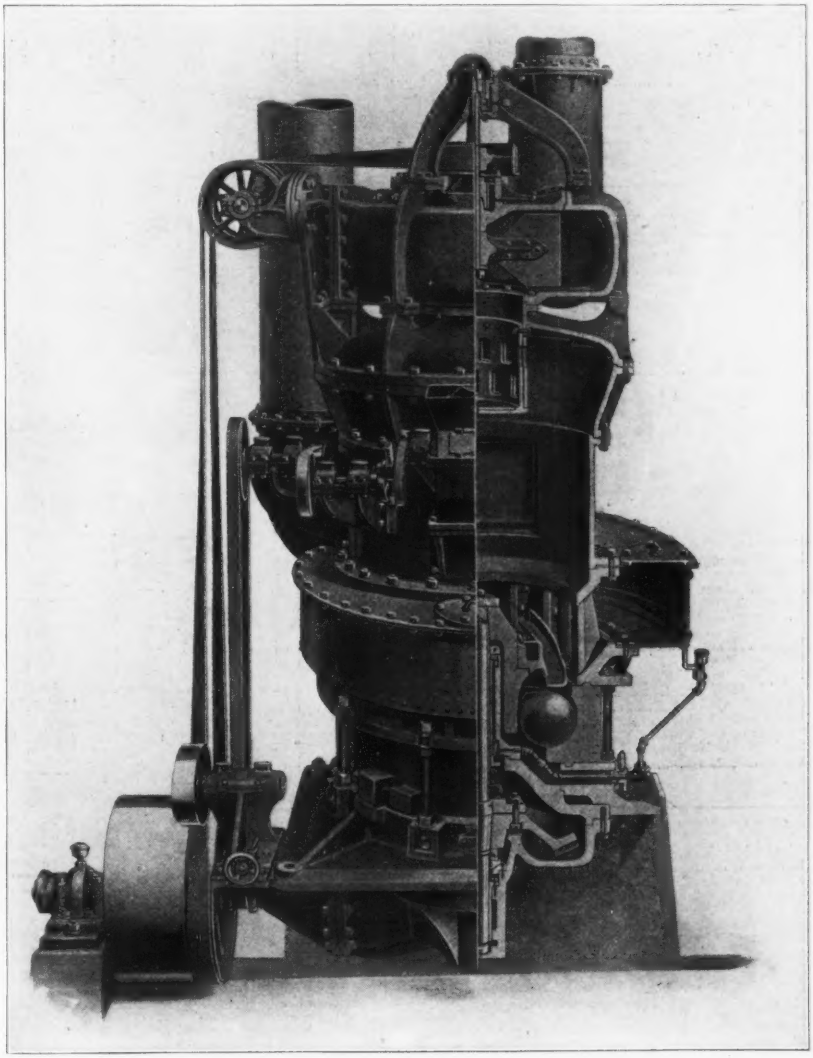
New Unit Pulverizer and Air Separator Mill

THE FULLER-LEHIGH CO., Fullerton, Pa., has recently placed on the market a unit pulverizer and air separating mill which was developed to meet the demand for an air separating mill capable of producing a finely pulverized product which will pass a 200-mesh sieve, with its accompanying higher fineness, to as great a degree as it is possible to obtain by air separation. Also, to have the air-separating element as an integral part of the mill itself, so as to make possible the operation of the unit mill and separator from one motor or one actuating belt drive.

An exhaust fan is mounted directly on top of the separating chamber of the mill and is driven by belt direct from the pinion shaft of the mill, whereby its speed is absolutely constant with the speed of the mill itself, thus giving an unvarying exhaust suction from the separating chamber without loss by frictional resistance to the passage of air through pipes.

The exhaust fan discharges vertically or angularly to a cyclone, or collecting medium which separates the fine product from the air, for discharge into bins or conveyors serving any portion of the installation. Most of the exhaust air from the separator is again returned to the pulverizer mill where it encircles the port section spirally, with a constant pressure through all of the ports into the internal portion of the mill, where it again goes through the process of separating the fine material from all that is elevated by the inclined fan blades mounted immediately above the grinding element. The exhaust fan shaft is mounted vertically in heavy bearings, the top bearing of which is supported by a heavy spider, and the bottom bearing cast solidly to the disc which is an integral part of the fan housing. Both of these bearings are self-oiling, the only attention required by them being the replenishment of the oil from the bearing supply pipes as required.

The material to be reduced is fed to the mill from an overhead bin by means of a reciprocating feeder mounted on the side of the mill. This feeder is driven direct from the mill countershaft by means of a belt to a reducing countershaft, which in turn drives by belt the adjustable crankshaft connected to adjustable arms operating the reciprocating feeder, which permits the operator to vary the amount of material entering the mill. This feeder is arranged to oppose the tendency of the exhaust fan to draw air into the mill with the material. In addition, the hopper of the feeder is provided with a slide gate which allows the operator to increase or decrease the amount of material entering the feeder. The material leaving the feeder enters the pulverizing zone of the mill. The pulverizing element consists of unattached steel balls which roll in a stationary, horizontal, concave-shaped grinding ring. The material discharged by the feeder falls between the balls and the grinding ring in a uniform and continuous stream, and is reduced to the desired fineness in one operation. Between the inner circumference of the concave-shaped grinding ring (which is mounted inside the base housing) and the base of the main bearing, is an annular space, leading downwardly to four equally spaced discharge channels, closed at their outer ends with quick opening cover plates. This annular space permits the deposit of any tramp iron which may pass the magnetic separator, obviating any possible damage to grinding element, and provides for the easy elimination of the foreign body or possible overload of material in the mill.



Fuller-Lehigh (Unit) pulverizer and air separating mill

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Buffalo, N. Y.			1.30 per net ton, all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton, all sizes			
Eastern New York	.90	1.80	1.70	1.60	1.60	1.50
Eastern Penna.	1.00	.....	1.60	1.60	1.60	1.60
Munns, N. Y.	1.00	1.50	1.50	1.25	1.25	1.25
Walford, Pa.	1.00	.....	1.60	1.60	1.60	1.60
Western New York	.70	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	2.00	.....	1.50	1.40	1.35	.....
Bettendorf, Ia.			All sizes, 2.00 cu. yd. f.o.b. quarry			
Buffalo, Iowa	1.00	1.30	1.40	1.20	1.30	1.30
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Columbia, Ill.	2.15	1.90	2.00	2.00	1.90	1.90
Dundas, Ont.	1.00	1.50	1.50	1.50	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	.....
Greencastle, Ind.	1.25@1.35	1.25	1.10	1.10	1.10	1.10
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	.....
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Lannon, Wis.	.90	1.00	1.00	1.00	1.00	1.00
Marblehead and Brillion, Wis.	1.10	.....	1.20	1.10	1.10	.....
Montrose, Ia.	1.35@1.50	1.50	1.50@1.60	1.50	1.50	1.50
Oshkosh, Wis.			1.40 per ton, all sizes			
River Roage, Mich.	1.25	1.40	1.40	1.40	1.40	1.40
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern, Illinois	1.75	1.60	1.50	1.50	1.50	.....
Stolle, Ill. (I. C. R. R.)	1.75	1.60	1.60	1.50	1.50	1.50
Stone City, Iowa	.50	.....	1.40	1.35	1.30	.....
Toledo, Ohio	1.84	1.99	1.99	1.99	1.84	1.84
Toronto, Canada	1.90	2.40	2.40	2.40	2.15	2.10
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.	.....	1.85	1.60	1.60	1.60	.....
Chickamauga, Tenn.	1.10	1.10	.....	1.00	.85	.....
Chico, Texas	1.10	.....	1.25	1.25	1.25	1.10
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Fort Springs, W. Va.	1.55	1.70	1.70	1.90	1.45	.....
Garnet and Tulsa, Okla.	.....	.....	1.60	1.60	1.45	.....
Ladds, Ga.	1.50	.....	.....	1.25	1.25	1.25
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	2.10
			Other sizes 1.80 per ton			
Blue Springs and Wymore, Neb.	.20	1.65	1.60	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	2.00	2.00	2.00	2.00	2.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	1.25	2.50	2.35	2.25	2.00@2.25	2.00
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.60	1.50	1.50	1.25	1.10	.....
Bound Brook, N. J.	2.00	2.30	2.00	1.70	1.60	.....
Dresser Jct., Wis.	1.00	2.45	2.45	2.30	2.00	.....
Duluth, Minn.	.75@1.00	2.25	2.00	1.50	1.30@1.50	.....
Dwight Station, Calif.			.75@1.00—all sizes			
E. Summit, N. J.	2.10	2.35	2.15	1.75	1.75	.....
Eastern Mass.	.60	1.95	1.75	1.50	1.50	1.50
Eastern New York	.90	1.80	1.70	1.60	1.60	1.50
Eastern Penna.	1.60	2.25	1.95	1.80	1.80	1.70
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	60@ .80	1.60@1.75	1.50	1.25	1.10	.....
Oakland, Calif.	1.75	1.75	1.50	1.50	1.50	1.50
Richmond, Calif.	.50*	.....	1.75*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	2.00	2.40	2.10	1.80	1.75	1.75
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Berlin, Wis.	1.60	.....	1.40	1.50	1.30	.....
Columbia, S. C.—Granite	.75	.....	2.75	2.50	2.35	.....
Dell Rapids, S. D.	1.00	.....	2.10	2.10	2.10	.....
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Eastern Penna.—Sandstone	1.10	2.00	2.00	1.70	1.70	1.70
Eastern Penna.—Quartzite	.90	1.80	1.55	1.30	1.30	1.10
Holton, Ga.—Granite	.40	.....	2.50	2.25	2.25	2.00
Lohrville, Wis.	1.60	.....	1.30	1.50	1.20	.....
Los Angeles, Cal.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	2.00
Middlebrook, Mo.—Granite	3.50@4.00	.....	.....	2.00@2.25	.....	1.25@1.75
Red Granite, Wis.	1.60	.....	1.30	1.50	1.20	.....
Sioux Falls, S. D.	1.00	.....	2.00	2.10	2.00	.....
Stockbridge, Ga.—Granite	.50	2 00	1.90	1.75	1.75	.....
Utley, Wis.	1.60	.....	1.30	1.50	1.20	.....

*Cubic yard. †Agrl. lime. ||R. R ballast. §Flux ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.50; bulk 2.75

Coldwater, N. Y.—Analysis, 56.77% $CaCO_3$, 41.74% $MgCO_3$, 70% thru 200 mesh, 95% thru 50 mesh, sacks 4.00; bulk 3.00

Grove City, Pa. — Analysis, 94.75% $CaCO_3$, 1.20% $MgCO_3$ — 70% thru 100 mesh; 80 lb. ppr., 5.50; bulk 4.50

Hillsville, Pa.—70% thru 100 mesh; sacks, 4.75; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.50; bulk 2.75

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

Walford, Pa. — 50% thru 100 mesh, 60% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 5.00—cloth, 5.25; bulk 3.50

Williamsport, Pa. — Analysis, 88-90% $CaCO_3$, 3-4% $MgCO_3$—50% thru 50 mesh; paper, 5.50; bulk 4.00

CENTRAL:

Alden, Ia.—Analysis, 99.16% $CaCO_3$ .... .80

Alton, Ill. — Analysis, 96% $CaCO_3$, 0.3% $MgCO_3$—50% thru 4 mes. 4.50

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh ..... 1.60@2.00

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bettendorf, Ia.—Analysis, 96.14% $CaCO_3$, 2.5% $MgCO_3$—50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Buffalo, Ia.—90% thru 4 mesh 1.00

Cape Girardeau, Mo.—Analysis, 90% $CaCO_3$, .044% $MgCO_3$ (90% thru 50 mesh, $2.00), 50% thru 4 mesh 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh 1.50

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh ..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh 2.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh 2.00

Marblehead, O.—Analysis, 33.42% $CaCO_3$, 4.29% $MgCO_3$—52.4% thru 100 mesh, 52.4% thru 50 mesh, 100% thru 10 mesh; sacks, 5.25; bulk 3.00

Limestone screenings; bulk 1.50

McCook, Ill.—Analysis, 54.10% $CaCO_3$, 45.04% $MgCO_3$—100% thru ¼-in. sieve, 78.12% thru No. 10, 53.29% thru No. 20, 38.14% thru No. 30, 34.86% thru No. 50, 22% thru No 100 ..... 1.50

Milltown, Ind. — Analysis, 93.10% $CaCO_3$, 3.2% $MgCO_3$—33.6% thru 100 mesh, 40% thru 100 mesh ..... 1.50@1.65

Mitchell, Ind.—50% thru 100 mesh 2.00

Montrose, Ia.—⅜-in. ..... 1.35@1.50

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O. — Analysis, 82.8% $CaCO_3$, 8.2% $MgCO_3$; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh ..... 3.25@5.00

50% thru 50 mesh ..... 1.75@2.00

Ridgeville, Ind.—Analysis, 98% $CaCO_3$ 100% thru 4 mesh 1.75

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R. — Thru ½-in. mesh — Analysis, 89.61% to 89.91% $CaCO_3$, 3.82% $MgCO_3$ 1.75

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 100 mesh ..... .50

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Whitehill, Ill. — Analysis, 97.12% $CaCO_3$, 2.50% $MgCO_3$ — 90% thru 100 mesh 5.00
50% thru 100 mesh 1.75
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25
SOUTHERN:
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk 4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh..... 4.75
Cartersville, Ga.—Analysis, 96% combined carbonates — pulverized limestone ..... 1.75@2.00
Claremont, Va. (Marlime) — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—(90% thru 100 mesh, $4.00), 50% thru 100 mesh 3.50
Dittlinger, Tex. — Analysis, 99.09% $CaCO_3$, .04% $MgCO_3$—90% thru 100 mesh ..... 2.00@3.00
90% thru 4 mesh ..... 1.00@2.00
Grovania, Ga.—Analysis, 95% $CaCO_3$, no $MgCO_3$—50% thru 100 mesh..... 2.50
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh..... 2.00
90% thru 50 mesh..... 1.50
Ladds, Ga.—Pulverized limestone..... 2.50
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk..... 3.00
Mascot, Tenn.—Analysis 52% $CaCO_3$, 38% $MgCO_3$.
80% thru 100 mesh..... 3.00
All thru 10 mesh..... 2.50
80% thru 200 mesh..... 4.50
Paper bags, $1.50 extra per ton; burlap, $2.00 extra per ton.
Maxwell, Va. 2.50
Ocala, Fla. — Analysis, 98% $CaCO_3$—75% thru 200 mesh..... 4.50
WESTERN:
Colton, Calif.—Analysis, 95% $CaCO_3$, 1½% $MgCO_3$—all to pass 14 mesh; bags, 6.50; bulk 5.50
Sacks, 15c extra, returnable.
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 2.00
Terminus, Calif. — Analysis, 96.2% $CaCO_3$, .04% $MgCO_3$—60% thru 200 mesh, 90% thru 100 mesh, 95% thru 50 mesh, 100% thru 4 mesh; sacks, 6.00; bulk 5.25
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:
Baltimore, Md. ..... 2.25@2.75
Berkley Springs, W. Va..... 2.00@2.25
Cedarville and South Vineland, N. J..... 2.00
Cheshire, Mass. ..... 5.00@7.00
Hancock, Md.—Damp ..... 2.50@3.50
Klondike and Pacific, Mo..... 2.50@3.00
Mapleton, Pa.—Dry 2.50
Damp 2.00
Massillon, Ohio 3.00
Millington, Ill. 1.75
Mineral Ridge, Ohio 3.00
Montoursville, Pa.—Green, washed..... 1.50@2.00
Oregon, Ill.—Large contracts..... 1.75
Ottawa, Ill. ..... 1.25@2.25
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. ..... 3.25@3.50
Round Top, Md.—Damp..... 1.60@1.75
St. Mary's, Pa.—Unwashed..... 2.40
Thayers, Pa. ..... 1.75@2.00
Utica, Ill. ..... 1.25@1.75
Zanesville, Ohio 2.50

FOUNDRY SAND:
Albany, N. Y.—Sand blast..... 4.50
Core 1.50
Molding fine, coarse and brass..... 2.00@2.25
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse ..... 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40@1.60
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Bowmantown, Pa.—Core ..... 1.35@1.50
Molding, coarse ..... 1.80@2.00
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, O.—Core ..... .40@1.25
Sand blast ..... 3.50@4.50
Furnace Lining 2.00
Molding fine ..... 1.50@2.25
Molding coarse ..... 1.50@2.25
Stone sawing 1.50
Traction ..... .40@ .75
Brass molding 2.50
Conneaut, O.—Molding fine ..... 2.25@2.50
Molding coarse ..... 2.00@2.25

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and le s
EASTERN:						
Attica, N. Y.	**.75**	**.75**	**.75**	**1.00**	**1.00**	**1.00**
Buffalo, N. Y.	1.10	.95			.85	
East Hartford, Conn.			.75 per cu. yd.			
Erie, Pa.		1.00		1.15		1.75
Farmingdale, N. J.	.48	.48	1.65	1.65	1.40	
Hartford, Conn.	**.90**		**1.25**	**1.15**	**1.15**	**1.15**
Leeds Junction, Me.		**.60@ .75**	2.00	1.75	1.65	1.50
Ludlow, Mass.	**.75***	**.75***	**1.70**		**1.50***	**1.50***
Philadelphia, Pa.	.75	.75		1.40	1.25	
Pittsburgh, Pa.		1.30	1.30	1.30	.85	.85
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		1.00			Pure white sand, 1.50	
Washington, D. C.	.60@ .75	.60@ .75	2.00	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.50		1.00		.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.60	.60		.60	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, O.	.90	.90@1.25	1.25	.90@1.25	.90@1.25	.90@1.25
Des Moines, Ia.	.90	.65	1.60	1.60	1.60	1.60
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.50	.50	1.00@1.25	1.00	1.00	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.70	.58	.90	.90	.72	.72
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.83	.77	.77
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Hawarden, Ia.		.70			1.60	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Le Mars, and Doon, Ia.		.90		1.80		
Lincoln, Neb.		Sand .40, sand and gravel .80, drained for shipment				
Mankato, Minn.	.50	.50	.75	.75	.75	.75
Mason City, Ia.	.90	.80	1.90	1.80	1.70	1.65
Milwaukee, Wis.	1.15	1.15	1.25	1.25	1.25	1.25
Minneapolis, Minn.	.35@ .50	.35@ .50	1.50	1.50	1.50	1.25@1.50
Moline, Ill.	.60@ .80	.60@ .80	1.20	1.20	1.20	1.20
Oxford, Mich.		.37		.85	.80	
Riton, Wis.		.40			.60	.60
St. Louis, Mo., f. o. b. cars	1.50	1.65	1.70	1.50		1.45
St. Louis, Mo., delivered on job		2.40@2.55	2.60	2.40	2.40	2.35
Summit Grove, Clinton, Ind.	.90	.90	.90	1.00	1.00	1.00
Terre Haute, Ind.	.75	.75	.85	.85	.75	.75
Winona, Minn.	.60	.50	1.75	1.50	1.25	1.25
Yorkville, Moronts, Oregon and Sheridan, Ill.		.60@ .80	.70@ .80	.70@ .80	.70@ .80	.60@ .80
SOUTHERN:						
Alexandria, La.	.60@ .80					1.20@1.50
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.			Sand 1.40—Gravel 1.50			
Estelle Springs, Tenn.	1.15	1.15	1.00	1.00	.90	.90
Ft. Worth, Tex.		2.00		2.00		2.00
Jedburg, Mo.		1.05	1.20	1.00	1.00	.95
Knoxville, Tenn.	1.15	1.15		2.15	1.95	1.75
Lake Weir, Fla.		.75				
Macon, Ga.		.75@1.00				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.	1.10	1.10		1.30		.90
New Orleans, La.	**1.00**		**1.75**		**1.25**	
Pine Bluff, Ark.	1.00@1.25	.80@1.05	Washed gravel, all sizes, 2.20			
Roseland, La.	.25		1.00	1.00		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.		(Kaw River sand, car lots, .75 per ton. Missouri River, .85)				
Niles, Calif.	1.00	1.00	1.40	.85@1.00	.85@1.00	.85@1.00
Pueblo, Colo.	1.10*	1.00*			1.50*	
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50*	1.50*	2.00*	1.50*		1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	**.60@ .80**		**.55@ .75**			**1.00**
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Ia.			.80 per ton—1.20 washed			
Detroit, Mich.	**1.10***					
Dudley, Ky. (Crushed Sand)		1.05		1.00		
Elkhart Lake, Wis.			Washed gravel .66			
Estelle Springs, Tenn.						.90
Fishers, N. Y.	.60	.65		.60		.50
Glenville, N. Y.				1.00*		
Hamilton, O.			6 in. and less, .20 per ton			
Hartford, Conn.		**1.00***				
Hersey, Mich.				.60	.60	.60
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Janesville, Wis.		.65			.65@ .75	
Lindsay, Tex.					.60	
Oxford, Mich.				.65	.65	
Pine Bluff, Ark.			Road gravel .60			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.		60% gravel, 40% sand 1.70				
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Waco, Texas		.80		1.50		1.30
Winona, Minn.	.70					
Yardville, N. J.		**.50@ .75**				
York, Pa.		1.10@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	3.50	1.10	2.50	1.25	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.		1.25	1.25	1.25	1.25	1.25	1.25
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, O.	2.40	2.15	other grades 1.75				
Jackson, O.	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.93	2.30	2.49	2.49	2.49	2.30	2.30
Youngstown, Dover, Hubbard, Leetonia, Struthers, Steubenville, Lowellville & Canton, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.00@1.25	1.15	1.05@1.10	.85@1.00	.85@ .90
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.00@1.25	1.15	1.05@1.10	.95@1.00	.85@ .90
Longdale, Goshen, Glen Wilton & Low Moor, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.						8.00		
Bellefonte, Pa.			11.50		8.50			
Buffalo, N. Y.		11.00	11.00	11.00			9.50	2.00*
Chippewa, Pa.					5.50			
Lime Ridge, Pa.					5.75			
Mt. Union, Pa.					7.50			
Paxtang and Le Moyne					5.00			
Rockland, Maine						8.00		
Rosendale, N. Y.					7.00			
Union Bridge, Md.			13.00		5.50			
Williamsport, Pa.			10.00		6.00			
West Rutland, Vt.						7.50		
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25					
York, Pa.			11.50		8.50			
CENTRAL:								
Alton and Hannibal, Ill.					11.50			
Delaware, Ohio			9.00					
Gibsonburg, Ohio	10.50							
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70*
Knowles and Valders, Wis.			12.50		5.00	9.00		
Marblehead, Ohio		9.00	8.50				8.00	1.70*
Mitchell, Ind.			12.00					
Sheboygan, Wis.					5.50	8.50		
Woodville, Ohio			8.50					
SOUTHERN:								
Burns, Tenn.			12.00		9.50			
Erin, Tenn.					7.50			
Knoxville, Tenn.			13.00		9.00			
Staunton, Va.					7.50	8.75		
WESTERN:								
Colton, Calif.			15.00					
Kirtland, N. Mex.					12.00			
Los Angeles, Calif.			15.00‡					
San Francisco, Calif.			19.50					
White Rock, Ohio	10.50							

‡100-lb. sacks; *180-lb. net, price per bbl.; †180-lb. net, non-returnable metal barrel.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core and brass molding	1.50
Molding fine and coarse	1.50
Dunbar, Pa.—Traction, damp	2.75
Traction, damp	2.75
Dundee and Chalfants, O.—Sand blast	3.00
Glass, core and traction	2.75
Molding fine and brass molding	2.25
Furnace lining	2.50
Molding coarse	2.00
Falls Creek, Pa.—Glass sand	2.50
Furnace lining, traction and molding coarse	2.00
Sand blast	3.50
Eau Claire, Wis.—Core	.75@1.25
Sand blast	3.00@4.25
Traction sand	.50
Franklin, Pa. and Utica, Pa.—Traction	2.50
Brass molding	2.25
Core	1.50@2.00
Molding fine	2.25
Molding coarse	2.00
Sand blast	5.00
Greenville, Ill.—Molding coarse	1.30@1.50
Howard, O.—Glass sand	3.00
Molding—Fine and coarse	2.50
Core, roofing and brass molding	2.50
Furnace lining and traction	2.25
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and stone sawing	1.65
Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50
Molding coarse	2.50@3.00
Mapleton, Pa.—Core, furnace lining, molding coarse and brass molding	2.00@2.75
Molding fine	2.25@2.75
Roofing sand	2.00@3.00
Sand blast	1.50@2.00
Massillon, O.—Glass sand, molding fine and coarse, core, and furnace lining	3.00
Traction	3.00
Michigan City, Ind.—Core, glass, traction and brass molding	.60
Millington, Ill. — Glass, core, furnace lining, roofing and stone sawing	1.50@1.75
Mineral Ridge, O. — Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.50
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Brass molding	1.50@1.75
New Lexington, O.—Molding fine	2.25
Molding coarse	2.00
Sand blast	3.00
Glass, core and traction	2.75
Furnace lining	2.50
Brass molding	2.25
Oregon, Ill.—Core and glass sand	2.00
Furnace lining	2.00
Molding fine and coarse	1.00
Sand blast	3.50
Stone sawing	2.00
Ottawa, Ill.—Crude silica sand	1.00@1.25
Core, molding, fine and coarse	1.00@2.25
Furnace lining	1.25@2.00
Roofing and traction	1.25@5.00
Sand blast	4.00@5.00
Stone sawing	1.50

Miscellaneous Sands

(Continued)

Ottawa, Minn.—Core	1.00@1.50
Glass, molding coarse, roofing, stone sawing (all crude silica)	1.00@1.50
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Rockwood, Mich.—Glass	3.00@3.25
Roofing	3.00@3.25
Sand blast	3.50
San Francisco, Cal.—Glass and roofing	3.00@3.50
Core, molding fine and brass	2.30@2.60
Furnace lining and molding coarse	3.60@4.25
Coarse core sand	3.60@4.25
Sand blast	2.30@3.60
Stone sawing and traction	2.30
Thayer, Pa.—Traction	1.75
Furnace lining	1.00
Molding fine and coarse	1.00
Core, green	1.50@1.75
Utica, Ill.—Core	1.10@1.25
Furnace lining	1.10
Molding, fine and coarse	.85
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	2.50
Same, green	2.25
Williamstown Junction, N. J.—Glass sand	2.80@2.90
Core, wet	2.50@2.60
Zanesville, Ohio — Molding fine and Brass	1.50@1.75
Molding coarse	1.35@1.50
Furnace lining	2.50
Glass, core and traction	2.50
Sand blast and steel molding	2.50
Pulverized silica thru 140 mesh	8.50
Thru 200 mesh	9.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	45.00
Blanks, per lb.	.08
Biltmore, N. C., ground talc—150-200 mesh, bulk	20.00@25.00
Pencils and steel workers' crayons, per gross	1.15@ 2.50
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt. — Ground talc (150-200 mesh), bags	8.00@10.50
Emeryville, N. Y.—150-200 mesh; bags	14.00
Glendale, Calif. — Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Gouverneur, N. Y.—Crude talc	4.00
Ground Talc (50-300 mesh)	13.50@15.50
Hailsboro, N. Y.—Ground Talc (150-200 mesh)	15.00@20.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@ 3.25
Ground talc (20-50 mesh), bags, 5.50@7.00; (200-350 mesh) bags	9.25@13.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	8.50@15.00
(Bags extra)	
Keeler, Calif.—Ground talc (200 mesh), bags	16.62
(Bags extra)	
Los Angeles, Calif.—Crude talc	10.00
No. 1	10.00
Ground talc, No. 2	16.00
Silver Talc Dust, 600 mesh	5.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	8.00@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	5.50@6.50
Mt. Pleasant, Tenn., analysis, 70% B.P.L.	7.50
Montpelier, Idaho—70% B.P.L.—Crude	5.00
Crushed 2-in. ring and dried	6.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	7.75

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$8.10
24x14	9.30	8.40	8.10	8.10
22x12	10.72	8.70	8.77	9.10
22x11	10.72	8.70	8.77	9.10
20x12	10.72	8.70	8.77	9.10
20x10	11.70	9.60	9.42	9.42
18x10	11.70	9.60	9.42	9.42
18x 9	11.70	9.60	9.42	9.42
16x10	11.70	9.60	9.42	9.42
16x 9	11.70	9.60	9.42	9.42
16x 8	11.70	9.60	9.42	9.42
18x12	11.05	9.30	9.10	9.10
16x12	11.05	9.30	9.10	9.10
14x10	11.05	9.30	8.77	8.77
14x 8	11.05	9.30	8.77	8.77
14x7 to 12x6	10.40	9.00	8.45	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.50	$5.75
22x11	9.10	7.75	7.75	5.75
Other sizes	9.10	8.10	8.45	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

Granulated slate per net ton, f. o. b. quarries, Vermont and New York, 7.50.

(Continued from preceding page)

Ground Rock

	Per 2000-lb. Ton
Centerville, Tenn.—B.P.L. 70%—90% thru 100 mesh	9.00@10.00
B.P.L. 75% (brown rock)	12.00
Mt. Pleasant, Tenn — B.P.L. 68%—13% Phosphorus	7.50@9.00
14% Phosphorus	8.00
B.P.L. 65@70%	7.00@9.00
Norwills, Fla.—(Fla. Hard Rock)—B.P.L. 68%	10.00

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Lakeland, Fla.—B.P.L. 60%	6.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Bound Brook, N. J.—Trap rock, carload lots; bulk		2.30
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	8.00@10.00	12.00@14.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	30.00@35.00	20.00@25.00
Milwaukee, Wis.	21.00@30.00	21.00@30.00
Missouri river points — Different colors	20.00@25.00	20.00@25.00
Piqua, O.—Marble	8.00@10.00	8.00@10.00
Sioux Falls and Red Granite, Wis.	7.50	7.50
Tuckahoe, N. Y.—White marble	7.00@12.00	10.00
Crushed white stone and marble dust in 100 lb. bags	6.50@12.00	
Tate, Ga.—White limestone, sacks extra	5.00@ 7.00	5.00@ 7.00
Wausau, Wis.	14.00@18.00	
Wisconsin and S. Dak. points—Granite, different colors, bulk or sacks	1.50@ 2.00	3.00@ 7.00
Granite dust in bags	6.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	18.00	30.00@45.00
Bellow Falls, Vt.	20.00	35.00
Birmingham, Ala.	16.00	27.50@50.00
Bridgeport, Conn.	31.00	32.00
Buffalo, Niagara Falls and Rochester, N. Y.	21.00	
Eau Claire, Wis.	20.00	30.00@40.00
Friesland, Wis.	25.00	
Houston, Tex.	18.50	21.00
Lockport, N. Y.	17.00	
Milwaukee, Wis.	17.00@18.00	35.00@65.00
Omaha, Nebr.	26.00	33.00
Piqua, O.	18.00	25.00
Portland, Ore.	25.00	45.00@75.00
St. Paul, Minn.	15.00	32.00
Springfield, Ill.	18.00	20.00@25.00
Tonawanda, N. Y.	20.00	
Virden, Ill.	18.00	20.00@25.00
Winnipeg, Man., Can.	19.00	40.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	8.00
Barton, Wis. (Face $17.50)	10.50
Bloomfield, Ont.	16.00
Boston, Mass.	13.50@15.00
Brighton, N. Y.	15.00
Buffalo, N. Y.	16.50
El Paso, Texas (Face 13.00)	12.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	13.50
Lancaster, N. Y.	14.00
Michigan City, Ind.	11.00
Miller, Ind.	10.00@10.50
Milwaukee, Wis. (delivered at job)	14.50
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.—Common	15.00
Face	25.00
Redfield, Mass.	15.00
San Antonio, Texas—Common	16.00
Face	27.50
South Dayton, Ohio	14.50
Syracuse, N. Y. (delivered at job)	20.00
F. o. b. cars	18.00
Toronto, Can.	15.00
Washington, D. C.	13.50
Winnipeg, Can. (less $1 trade disc.)	16.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	22.25	17.50
Boston, Mass.	22.25	20.25
Cincinnati, Ohio	16.70	14.50
Chicago, Ill.	20.00	.....
Dallas, Tex.	27.50	25.00
Denver, Colo.	.....	16.00
Detroit, Mich.	22.00	19.00
Fort Dodge, Ia.	19.70	17.00
Genoa, Ohio	10.50	.....
Grand Rapids, Mich.	15.65	.....
Gypsum, Ohio	13.90	17.00
Los Angeles, Calif.	.....	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	28.00	.....
New Orleans, La.	.....	17.00
New York, N. Y.	16.49	15.00
Oakfield, N. Y.	16.70	.....
Plasterco, Va.	19.80	.....
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	24.40	22.00
Seattle, Wash.	27.00	.....
	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	1.60	1.50
Baltimore, Md.	(ton)	12.75
Boston, Mass.	3.50	3.25
Cincinnati, Ohio	(ton)	12.25
Chicago, Ill.	.....	1.75
Dallas, Tex.	.....	3.00
Denver, Colo.	3.00	.....
Detroit, Mich.	2.00	1.80
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.80	1.50
Montreal, Que.	15.00	(ton)
New Orleans, La.	2.75	2.00
New York, N. Y.	.....	3.79
St. Louis, Mo.	.....	2.50*
San Francisco, Calif.	.....	2.25*
Seattle, Wash.	3.50	.....

* 280-bbl. (net).

Portland Cement

Current prices per bar el in carload lots, f. o. b. cars, without bags.

Atlanta, Ga.	2.60
Baltimore, Md. (del.)	3.58
Birmingham, Ala	3.05
Boston, Mass.	2.86
Cedar Rapids, Ia.	2.51
Cincinnati, Ohio	2.57
Cleveland, Ohio	2.43
Chicago, Ill.	2.17
Dallas, Tex.	2.60
Davenport, Ia.	2.47
Denver, Colo.	3.10
Detroit, Mich.	2.43
Duluth, Minn.	2.10
Indianapolis, Ind.	2.43
Kansas City, Mo.	3.20
Los Angeles, Calif.	3.21
Milwaukee, Wis.	2.39
Minneapolis, Minn.	2.41
Montreal, Que.	2.75
New Orleans, La.	3.20
New York, N. Y.	260@2.70
St. Louis, Mo.	2.90
San Francisco, Calif.	3.09
Seattle, Wash.	3.10
Winnipeg, Man.	1.00

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ Sand Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board—¼x32x36" 1500 lbs. Weight Per M Sq. Ft.	Plaster Board—⅜x32x36" 2000 lbs. Weight Per M Sq. Ft.	Wallboard, ⅜x32 or 48", 6'-10', 2000 lbs. Lengths Per M Sq. Ft.
Akron, N. Y.	3.50	.....	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alabaster, Mich.	3.50	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kan.	3.50	4.50	7.50	9.00	11.00	11.50	11.00	.....	20.00	13.00	19.375	20.00	36.75
Castalia, Ohio	3.50	6.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centerville, Iowa	3.50@4.20	4.50@7.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
†Eldorado, Okla.	.....	.....	.....	.....	11.00	11.50	.....	.....	15.50	.....	27.20	29.30	39.55
Fort Dodge, Ia.	3.50	4.50	7.50	9.00	11.00	11.50	16.45	.....	25.80	22.00	19.375	20.00	30.00
Grand Rapids, Mich.	3.50	4.50@7.00	7.50	9.00	11.00	11.00	19.50	.....	27.25	22.00	19.375	20.00	30.00
Gypsum, Ohio	3.50	4.50	7.50	9.00	11.00	11.00	20.25	8.00	27.95	20.00	19.375	20.00	30.00
Gypsumville, Man.	3.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hanover, Mont.	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Loveland, Colo.	3.50	4.50	7.50	9.00	11.00	11.50	.....	.....	29.80	.....	.....	.....	.....
Oakfield, N. Y.	3.50	4.50	7.50	9.00	11.00	11.00	21.20	7.50+	28.25	22.00	19.375	20.00	30.00
Piedmont, S. D.	.....	.....	7.50	9.00	11.00	11.50	.....	.....	32.25	.....	27.97	31.04	41.18
Plasterco, Va.	4.50	.....	7.00	9.00	11.00	11.00	21.90	.....	29.90	20.00	21.375	22.00	.....
Port Clinton, Ohio	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rapid City, S. D.	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
†Southard, Okla.	3.50	4.50	7.50	9.00	11.00	11.50	11.00	.....	15.50	.....	26.20	28.70	39.40

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.

* Shipment in bulk 25c per ton less; †Acme, Tex., freight rates govern; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional.

General Market News

Freight Rates on Sand and Gravel from Indiana to Illinois Held Unreasonable

IN A REPORT written by Chairman Clark on No. 11475, LaFayette Hydraulic Gravel Co. et al. vs. C. & E. I. et al., opinion No. 7046, 62 I. C. C. 729-32, the Interstate Commerce Commission held rates on sand and gravel from LaFayette to points in Illinois to be unreasonable and unduly prejudicial in relation to rates on the same commodities from Attica, Ind., to the same destinations. The carriers by Nov. 1, are to establish rates from LaFayette which do not exceed those on like traffic from Attica by more than the following amounts in cents per net ton: Danville 20 cents; beyond Danville, to and including Sidney and Champaign, 15 cents; beyond Sidney, to and including Gypsum City, Effingham, Altamont, and Decatur, 12 cents; beyond Gibson City, to and including Forrest and beyond Decatur, to and including Springfield and Litchfield, 10 cents; beyond Springfield and Litchfield, 8 cents; between Thomas and Rantoul, both inclusive, 20 cents; Prospect and Tomlinson, 15 cents; Assumption, 10 cents; Cadwell, 15 cents; between Chatham and Carlinville, both inclusive, 10 cents; between Westville and Ridge Farm, both inclusive, 20 cents; Mattoon and LeRoy, 12 cents; and between Rosamond and Moro, both inclusive, 10 cents.

Would Encourage New Cement Plant

IT IS PROBABLE that the Allied Chemical and Dye Corporation will let some other company develop the clay deposits found at Chaumont, in Jefferson County, New York, and acquired by the Solvay Process Co., one of the largest subsidiaries figuring in the recent merger, shortly before the merger became a fact. It is said an investment of $5,000,000 will be required in order to establish the necessary plant and working capital.

The particular kind of clay and the limestone found at Chaumont are basic elements in the manufacture of portland cement. It was the limestone deposits that interested the Solvay company; the clay was merely incidental.

Geologists employed by the Solvay company have covered the region for several years. Based on their reports the company has acquired large holdings along the shore of Chaumont bay and up Chaumont creek.

It was 25 years ago that first shipments of clay and limestone were made to the Solvay Process Co. in Syracuse, N. Y., by the Adams & Duford Co. of Chaumont village and in recent years the Solvay company has developed its own holdings, the purchase of land being made for it by an official of the Chaumont concern.

Marble Cliff Quarries Co. Resumes Agstone Business

AFTER HAVING been out of the agricultural limestone business for a long period due to a fire which destroyed its agricultural limestone plant, the Marble Cliff Quarries Co., Columbus, Ohio, again is in the field as a manufacturer of ground limestone for agricultural purposes.

The company will manufacture two grades of limestone, known as limestone meal and screenings; limestone meal being ground very fine so that 95 per cent will pass through a 10 mesh screen; screenings being thoroughly washed, free from all impurities and 100 per cent passing through a 4 mesh screen. The meal is offered at $2.25 per net ton and limestone screenings at $1.45 per net ton, all quotations f. o. b. cars at Marble Cliff, Ohio. W. H. Margraf is sales manager of this department.

State of Indiana Sues Lake Sand Operator

A COMPLAINT alleging that the Great Lakes Sand Co., whose headquarters are in Chicago, has damaged the State of Indiana $50,000 worth and asking for a temporary injunction, damages and then a permanent restraining order to prevent the company from taking sand from Lake Michigan just off the Lake, Porter and Laporte counties' shores, has been sent to the Lake Circuit Court by U. S. Lesh, attorney-general of Indiana.

The complaint says that lake sand is washed up on the beaches, where it dries and is blown over approximately 50,000 acres of northern Indiana land, forming dunes, and that the operations of the company are preventing this natural action. The complaint alleges that the company in the last year has taken out approximately 1,000,000 cubic yards of sand.

The court action was begun at the instance of the State Department of Conservation.

[It should be added that these sand piles constitute the famous "dune district" of Indiana, which is quite a summer resort, although why anybody wants to go and play in a section resembling the Sahara Desert, in these prohibition times, is more than we can see.—Editor.]

Phosphate Shipments Falling Off Slowly

SOME FALLING off in the amount of phosphate shipments from the port of Tampa, Florida, is seen in the figures for July, compared with those for June, and a decided decrease from the amount for July a year ago. During the past month thirteen vessels carried 45,680 tons of phosphate to foreign ports, while eleven cargoes went coastwise with 22,993 tons, making a total of 68,673 tons for the month.

The amount for June was foreign, 50,932; coastwise, 29,007; total, 79,939 tons. For July, 1920, foreign, 66,140; coastwise, 68,-114; total, 134,280 tons.

While the volume of shipments as a whole is much less than at this time last year, the foreign tonnage has held up much better than the coastwise, the percentage being much increased.

Prize for a Sand Name

THE PRATT Building Material Co. of San Francisco, Calif., offered prizes totaling $125 for the best commercial name suggested for the sand from a new pit in Monterey County, California—yellow sand of two grades, fine and coarse.

The name drawing down the first prize was "Prattco Amber" sand. There were 172 names submitted by the 112 contestants. The judges were well-known business man and advertisers of San Francisco.—*The National Sand and Gravel Bulletin.*

South Dakota State Cement Plant Legal

AT THE REQUEST of the Governor of South Dakota the judges of the Supreme Court of that state have passed upon the legality of a state-owned and operated cement plant. The opinion of the court is that this would be legal. (180 N. W., 957.)

Death of W. H. Harrison

THE Portland cement industry has lost one of its oldest and most respected members in the recent death of W. H. Harrison, president of the Cape Girardeau Portland Cement Co., Cape Girardeau, Mo. Mr. Harrison was born in Columbus, Ohio, in 1848 and in 1907 he organized and incorporated the Cape Girardeau Portland Cement Co. He was also one of the directors of the Himmelberger-Harrison Lumber Co., of Cape Girardeau and a director of the Portland Cement Association.

News of the Industry

Incorporations

The **Newton Sand and Gravel Co.**, Boston, Mass., has been incorporated for $124,000 by L. M. Messenger and E. M. Finn.

The **Carolina Concrete Products and Construction Co.** has been incorporated in Charlotte, N. C., with a capital stock of $20,000, by A. R. Long and W. Sinclair Stewart.

The **Kelscite Stone Products Co.** has been incorporated in Kelsey City, Fla., with a capital of $25,000, by H. G. Mitchell, president; W. M. Huestis, secretary, and others.

The Federal Lumber and Supply Co., which has been incorporated in Omaha, Neb., will deal in building materials. The capital is $100,000, and W. J. McCaffrey is an incorporator.

Paul R. Sheahan & Co. have incorporated with a capital of $30,000 in Roanoke, Va., to establish a sand and gravel business. Paul R. Sheahan is president and W. W. Field is secretary.

The Blue Diamond Materials Co., Boston, Mass., has been incorporated for $50,000 to deal in lime, sand and kindred materials by Ed. O. Quinn, president; Wm. H. Hastings, 40 Court Street, Boston, treasurer, and William C. Hay.

The Universal Building Supply Co. has been incorporated in Huntington, W. Va., with a capital of $50,000, to manufacture concrete blocks. The company has acquired a plant with a capacity of 600 blocks per day and will increase the capacity to 1000 blocks per day.

Gypsum

The Ebsary Gypsum Co., Rochester, N. Y., announces the early completion of its new and strictly modern plaster mill at Wheatland, N. Y., with a daily capacity of 400 tons of stucco and wall plaster. Also, that Arthur S. Black, formerly with the American Gypsum Co., of Port Clinton, Ohio, has been appointed general sales manager for the company.

Manufacturers

The Holt Mfg. Co., Peoria, Ill., announces a substantial reduction in prices of 5-ton and 10-ton "Caterpillar" tractors.

The Schaffer Engineering and Equipment Co., Pittsburgh, has combined its administrative, sales and manufacturing departments in its new general offices at 2828 Smallman Street, Pittsburgh.

The Hercules Powder Co., Wilmington, Del., announces a reduction of 25 cents per 100 lbs. on the price of all Hercules high powder explosives.

The Link-Belt Co., Chicago, Ill., announces a practically uniform reduction of 10 per cent on malleable iron and steel (ss class) chains, sprockets, buckets and other products effective August 22, 1921.

The Weller Manufacturing Co., Chicago, Ill., has issued a very interesting and valuable booklet (35D) on spiral conveyors. As spiral or screw conveyors are much used for a variety of purposes in the rock products industries this new catalog and price list should have a very wide-

The Novo Engine Co., Lansing, Mich., has issued a very interesting and valuable booklet (catalog No. 921) on Novo engines for air compressor outfits, pumping outfits, hoisting and sawing outfits. The booklet contains a wealth of information and should have a wide call among rock product producers.

The Brown Hoisting Machinery Co., Cleveland, Ohio, has just issued Booklet 2-21, which describes the operation of the No. 2 Brownhoist locomotive crane. The point is made that a small locomotive crane can handle loads up to several tons and is the ideal way to handle bulk or heavy materials. These cranes are versatile machines that can go almost anywhere and do practically every kind of handling work. The booklet is very well illustrated and free copies may be obtained by addressing the company at the above address.

Lime

The Sovereign Lime Co. plant, Montreal, Que., and 100 cords of firewood were destroyed by a fire on July 10.

The Centaur Lime Co., Vandeventer and Market streets, St. Louis, Mo., is about to begin the erection of a two-story warehouse.

The Ohio C. Barber Lime Co., 822 Munsey Bldg., Baltimore, Md., has taken over the business of the O. C. Barber Fertilizer Co. The main plant is at Barber, Va., where the product produced is the "Falling Springs" precipitate lime —a dissolved limestone naturally precipitated.

Personal

C. K. Howe, of Beaufort, N. C., is in the market for a concrete mixer.

D. F. Hefferman, assistant superintendent of the New York and New England Cement and Lime Co. plant (Atlas subsidiary), Hudson, N. Y., has resigned.

Robert L. James, Pittsburgh, Pa., has purchased 160 acres of land and kilns and machinery of the Canal Lime & Stone Co. in Washington County, Maryland.

O. E. Wasson, former superintendent of the old Knickerbocker Portland Cement Co., Hudson, N. Y., which was recently taken over by the International Cement Corporation, was presented with a gold watch, chain and Elks' charm by a committee of men representing the employes. This was given to him as a token of the esteem in which he was held by every employe.

Buyers' Bulletin

MANUFACTURERS OF MACHINERY AND EQUIPMENT:—These inquiries are live, up-to-date inquiries that have come direct to us from the individual in each case.

READERS OF "ROCK PRODUCTS":—This Department is for your special help and service. If you do not see what you require advertised in "Rock Products," tell us your needs and we will publish them here. There is no charge for this service.

Mr. J. E. Wilson, Engineer, care Chas. O. Warner Co., Devault, Pa., is interested in catalogs and prices on dredging pumps, sand pumps, and weighing equipment. He will also appreciate anything pertaining to river dredging equipment.

The Wheeling Building Material Co., Wheeling, W. Va., wants Paroid Roofing. They are under the impression that this was made by the National Roofing Co. Any information along these lines will be appreciated by them.

The Calera Lime Works, Calera, Ala., are in the market for 1 second hand gasoline locomotive and 1 second hand wooden tank, 2500 to 3000 gallon capacity.

A. B. Searle & Staff, White Bldg., Fitzalan Sq., Sheffield, England, would like catalogs and full information on kilns of 50 tons per day capacity.

D. Newton Henson, S. Cannon Ave., Hagerstown, Md., advises that he is interested in securing catalogs and data from manufacturers of concrete block and brick machines.

Torrance Lime & Fertilizer Co., Lonita, Calif., Mr. S. M. Purple, Gen. Mgr., want catalogs and prices on the following equipment: bagging machines, bins, buckets, screens, rock drills, hoists, lime hydrators, lime kilns, pulverizers, conveying equipment and crushers.

Bruno Pizzimenti, Yorktown, Va., would like catalogs and data on clutches, steam and water hose, hydraulic packing, oils and lubricants, gasoline pumps, valves and wrenches. He also advises: "Want special data on 12" altitude regulating valve and 7 1" air relief valves for water mains. Want prices and drawings at once."

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

By Virtue of Unsatisfied Loans

made by a Bank to a large Contractor, we offer for immediate acceptance any part of

5—5 TON GARFORD TRUCKS

with WOOD AUTOMATIC HOISTS AND DUMPER BODIES. All in good running order and newly painted at

$1800 each F. O. B. Philadelphia, Pa. This Is Less Than One-Third Their Cost New Today

Terms can be arranged if secured

George T. Ritchings, 135 Broadway, New York City
REPRESENTING THE OWNER

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′ 6x50′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 3½x25′, 5x60′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 2½x3″ 3x3½′ pebble and ball mills; 8x4′, 6x4′ and 4x4′ continuous ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 30x60″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 36″ and 40″ cage mills; 3′ and 4½′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and No. 000, No. 00 and No. 0 Raymond mills; one No. 5 Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens, Richardson automatic scales.

Air compressors and tanks.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

1—Ingersoll-Rand Type 10 belt driven air compressor complete with receiver and force feed lubricating system, A-1 condition. $1500.00 F. O. B. Plant.

1—2 drum steam hoist, 8x12 cylinders, 22 H. P. boiler. Also steam pumps and air drills.

American Gypsum Company
Akron, N. Y.

20—3-yard, side dump, 36″ gauge Oliver Tram cars.
14—1½-yard, side dump, 36″ gauge all steel tram cars.
12—1-yard, side dump, 36″ gauge all steel tram cars.
1—Sparta Number 30 oil or well drill rig complete.
2—48″ diam. by 24′ long American Process dryers.
Address

E. W. COOPER, ENGINEER
174 3rd Ave., No. Nashville, Tenn.

One 50-ton, standard gauge Baldwin Mogul; 170 lbs. pressure.
One 56-ton, standard gauge American 10-wheeler; 175 lbs. pressure.
Two 50-ton, standard gauge Brooks 6-wheel switchers; 160 lbs. pressure.
One 42-ton, standard gauge Shay geared locomotive.
One 24-ton, standard gauge Shay geared locomotive.
One 14-ton, 36″ gauge American Saddle Tank.
Two 23-ton, brand new 36″ gauge Porter 6-wheel switchers; separate tenders.
One Model 14-B Bucyrus Shovel.

The above are only a few items of our stock. Will gladly send you our complete stock lists.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR RENT AND SALE

13—6-yd. re-built dump cars, std. gauge.
20—12-yd. Westerns, like new, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, used 8 mos.
1—Marion 36 combination shovel and drag-line, No. 4725, caterpillar traction, 1½-yd. bucket; used 4 mos.; built March, 1921.
1—Marion 76 steam shovel, No. 3503, std. gauge.
1—Marion 76 steam shovel, No. 3503, std. gauge.

LOCOMOTIVES

2—32-ton Vulcan four-driver saddle-tank, used sixty days; built March, 1921.
1—40-ton 17x24 in. four-wheel switcher.
2—50-ton 18x24 in. six-wheel switchers.
2—NEW 25-ton six-wheel Porters, separate tenders, 36 in. gauge.
2—18, 14, and 10-ton Vulcans, 36 in. gauge.

Locomotive-Cranes, Railway Equipment, Etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Building Chicago, Ill.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

NO. 8-D, GATES GYRATORY CRUSHER

STANDARD DRIVE

Fitted with manganese head and concaves. Included with this crusher, we have the following extra spare parts:

1 New, Manganese head.
1 New, set of manganese concaves.
1 New, main shaft.
1 New, Spider, and 2 New, eccentrics.

We also have many other sizes and types. We specialize in good quarry equipment of all classes. Write us fully.

Reading Engineering Co., Inc.
1227 Tribune Bldg., New York, N. Y.

IMMEDIATE DELIVERY

6, 7½, 9, 10 and 18 K Crushers

18K GATES, ANGLE DRIV. (BARGAIN).
1—9K GATES REG. DRIVE (BARGAIN).
6—290 HP. B. & W. BOILERS 200 lb. & Superhtrs.
350—HP. Heine 150-175 lb. ASME Code.
No. 10 McCULLY, BARGAIN, $6,750.
4—No. 6 Gates (Mang. fit.) nickel steel shafts; 50 and 75 HP. S. D. hoists; 25-cy. motor.
4—290 HP. NEW. 200 B. & W. Boilers.
4,000 ft. ROEBLING TRACTION CABLE, ⅝ in.
Air Compressors (steam belt), 50 to 4,000 ft.
5, 6 and 12-ton, 24-in. gauge gasoline loco's.
1—8x8 and 10x10 Air Comp. (belt).
2—180-ft. quick-shift, 30-ft. bucket towers.
6-in., 8-in. and 10-in. SAND PUMPS.
25—40-HP. Thomas D. D. Elec. Hoist.; A. C., 60 cy.
5, 10, 15-ton Holt Tract.; prac. NEW.

SEND US YOUR INQUIRIES. Sand pumps, motors, contractors' equipment, etc.

ROSS POWER EQUIPMENT CO.
Indianapolis, Indiana

New Rubber Belting

300 ft. 12″ 6-ply	$0.99	per foot
423 ft. 14″ 5-ply	1.04	per foot
527 ft. 14″ 6-ply	1.25	per foot
529 ft. 16″ 6-ply	1.39	per foot
520 ft. 16″ 8-ply	1.90	per foot
150 ft. 18″ 6-ply	1.48	per foot
512 ft. 18″ 8-ply	2.00	per foot
216 ft. 24″ 8-ply	3.15	per foot

Rolls Cut to Any Length

National Belting and Salvage Company
268 East Water Street Milwaukee, Wis.

STEAM SHOVEL

New Bucyrus, 2½ yard capacity, Railroad type. This machine is NEW, has never been in operation, is of latest design, equally efficient in earth or rock excavation. Bargain for quick sale.

A. J. O'NEILL CO.
1524 Chestnut St. Philadelphia, Pa.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Superintendent

Desires engagement; long experience in heavy steam shovel operations, crushing and gravel plants, economical production. Location anywhere if proposition has merit and future. References.

Box 1498 Care Rock Products
542 S. Dearborn St., Chicago, Ill.

EQUIPMENT BARGAINS

3-ton Plymouth 4' 8½" ga. Gasoline Locomotive.
7x12 cyl. 36 in. gage Davenport Saddle Tank.
10—24 in. gage 1½-yd. Western Dump Cars.
15—36 in. gage 4 yd. Western Dump Cars.
3—16 yd. Western Air Dump Cars.
1—⅝ yd. Thew "O" Traction Shovel.

ZELNICKER IN ST. LOUIS
"Everything for the Quarry"

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

FOR SALE

Bauxite Mine showing some very high ore. Will bear investigation.

PORTER WARNER
335 Volunteer Life Bldg., Chattanooga, Tenn.

Keystone Excavator for Sale

Shovel No. 3 with skimmer scoop built with enclosed cab. Shop No. 405. This shovel has only been used in light sand work during the summers of 1918, 19 and 20. First class condition. At present at Poughkeepsie, N. Y.

Whitehead Brothers Company
P. O. Box 864 Albany, N. Y.

Derricks—Hoisting Engines

For derricks, hoisting engines and material handling equipment, write us and save money. We have in stock derricks 8"x8" three tons to 20"x20" thirty tons capacity. Also 70 hoisting engines and car pullers, one, two and three drums, friction drums, reversible, handle 5000 pounds on single line. Pumps, rock drills, crushers, cars, cable, rope, blocks, etc. $500,000 stock.

Wilson Machinery Company
331 West 35th St., Chicago

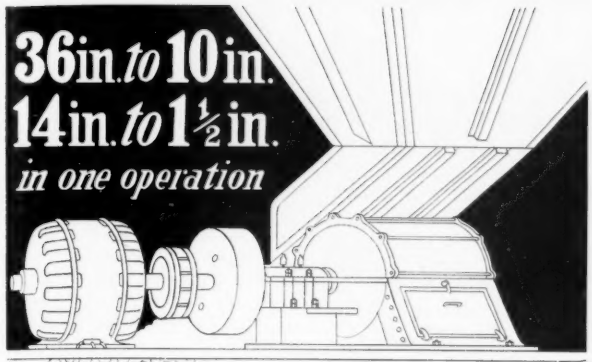
SEVERAL BELT BARGAINS

98 ft. 24" 4-ply Rubber-Covered Conveyor Belting, slightly used.....$1.50 per foot
100 ft. 30" 8-ply Canvas-Stitched Belting, slightly used.....$1.62 per foot

NATIONAL BELTING AND SALVAGE CO.
268 East Water St., Milwaukee, Wisconsin

When writing advertisers please mention ROCK PRODUCTS

When writing advertisers please mention ROCK PRODUCTS



Williams Stone Crushers

"Mammoth" and "Jumbo" take the place of a whole battery of crushers.

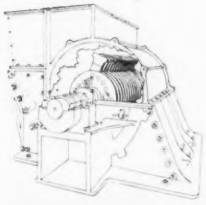
The Williams Mammoth Crusher takes limestone up to 36 inches and breaks it down to 10 inches and smaller. The "Jumbo" takes 14-inch stone and breaks it to 1½ inches and finer, in one operation. If used as a secondary crusher, the "Jumbo" takes stone as fast as the largest jaw crusher can deliver it, or from 50 to 200 tons per hour. It takes only about 1 h.p. per ton of rock crushed per hour, to operate the "Jumbo." With finer screens, the "Jumbo" will crush limestone for agricultural purposes.

Original Hammer Principle

The hinged hammer principle originated and perfected by Williams can be adapted to any conditions in your plant. The Williams Engineering Department makes no charge for complete analysis of your needs and preliminary plans. Put your crushing problems up to us.

Used by Over Fifty Cement Companies

Over fifty prominent cement manufacturers are satisfied users of Williams Stone Crushers. The Monarch Cement Co., Humboldt, Kans., crush stone with a No. 6 Jumbo for 400,000 to 600,000 barrels of cement per year with practically no repair expenses in five years. They say: "It has been a source of pleasure to operate this crusher from every standpoint." The Southwestern Portland Cement Co., of El Paso, Tex., report that a Williams Jumbo cuts their horsepower requirements to 100 h.p. for 100 tons per hour.



Write for full data, Dept. 4

Williams Patent Crusher and Pulverizer Company
St. Louis, Missouri
67 Second St. San Francisco, Calif.
37 W. Van Buren St. Chicago, Ill.

Williams
Patent Crushers – Grinders – Shredders

With a low price and extravagant promises, anyone can sell once.
"Tool Steel" gears sell regularly.

We promise that "Tool Steel" gears will last

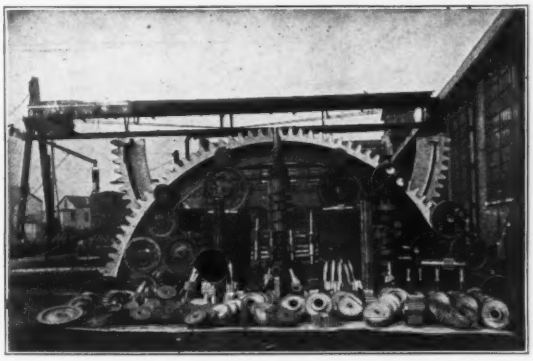
5 to 8 times as long as untreated gears.

2 to 3 times as long as special quenched or case hardened gears

and

We make good on this promise.

"Tool Steel" gear about ⅓ worn after 58 months. Untreated gears lasted 9 months in the service



"Tool Steel" quality from the large Tube and Ball mill gears to small machinery gearing

The Tool Steel Gear & Pinion Co.
Cincinnati, Ohio

Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

Aerial Tramways

Interstate Equip. Co.
New York, N. Y.

Bags and Bag Machinery

Bates Valve Bag Co.
Chicago, Ill.
Jaite Co., The
Jaite, Ohio
Valve Bag Co. of America
Toledo, Ohio.

Belting

Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio.
New York Belting & Packing Co
New York, N. Y.

Brick Machines

Wert Mfg. Co.
Chicago, Ill.

Blasting Supplies

Du Pont de Nemours & Co., E. I
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Buckets, Elevator

Hendrick Mfg. Co.
Carbondale, Pa.
Orton & Steinbrenner
Chicago, Ill.

Buckets

Blaw-Knox Co.
Pittsburgh, Pa.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
McMyler Interstate Co.
Cleveland, Ohio.
Owen Bucket Co.
Cleveland, Ohio.

Cableways

Blaw-Knox Co.
Pittsburgh, Pa.
S. Flory Mfg. Co.
Bangor, Pa.
Interstate Equip. Co.
New York, N. Y.

Calcining Machinery

Atlas Car & Mfg. Co.
Cleveland, Ohio.
Butterworth & Lowe
Grand Rapids, Mich.

Cement Machinery

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

Chains and Transmitting Machinery

Columbus-McKinnon Chain Co.
Columbus, O.

Conveyors and Elevators

Caldwell, H. W., & Son Co.
Chicago, Ill.
Jeffrey Mfg. Co., The
Columbus, Ohio.
Link Belt Co.
Chicago, Ill.
Robins Conveying Belt Co.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Sturtevant Mill Co.
Boston, Mass.
Universal Road Mach. Co.
Kingston, N. Y.

Cranes—Locomotive Gantry

Ball Engine Co.
Erie, Pa.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Byers Mach. Co., The.
Ravenna, Ohio.
Chisholm-Moore Mfg. Co.
Cleveland, Ohio.
McMyler-Interstate Co.
Cleveland, Ohio.
Ohio Locomotive Crane Co.
Bucyrus, Ohio.
Orton & Steinbrenner
Chicago, Ill.
Osgood Co., The
Marion, Ohio.

Crushers and Pulverizers

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
Austin Mfg. Co.
Chicago, Ill.
Bacon, Earle C., Inc.
New York, N. Y.
Buchanan Co., Inc., C. G
New York, N. Y.
Butterworth & Lowe
Grand Rapids, Mich.
Chalmers & Williams
Chicago Heights, Ill.
Fuller-Lehigh Co.
Fullerton, Pa.
Jeffrey Mfg. Co., The
Columbus, Ohio.
K. B. Pulverizer Co.
New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp
New York, N. Y.
Kent Mill Co.
Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co.
Lewistown, Pa.
McLanahan-Stone Mach. Co.
Hollidaysburg, Pa.
Munson Mill Machinery Co.
Utica, N. Y.
New Holland Machine Co.
New Holland, Pa.
Pennsylvania Crusher Co.
Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co.
Chicago, Ill.
Smidth & Co., F. L.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Sturtevant Mill Co.
Boston, Mass.
Traylor Eng. & Mfg. Co.
Allentown, Pa.
Universal Crusher Co.
Cedar Rapids, Iowa.
Universal Road Mach. Co.
Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co
Chicago, Ill.

Crusher Feeder

Maddox Fdy. & Machine Co.
Archer, Fla.

Derricks

Terry Mfg. Co.
New York, N. Y.

Dipper Teeth

American Manganese Steel Co.,
Chicago Heights, Ill.

Dragline Buckets

Brown Hoisting Mach. Co.
Cleveland, Ohio

Drills

Armstrong Mfg. Co.
Waterloo, Iowa.
The Loomis Machine Co.
Tiffin, Ohio.
Sanderson Cyclone Drill Co.
Orrville, Ohio
Wood Drill Works
Paterson, N. J.

Dryers

American Process Co.
New York City.
Vulcan Iron Works
Wilkes-Barre, Pa.

Dust Collecting Systems

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

Dynamite

Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Engines, Oil & Gas

Novo Engine Co.
Lansing, Mich.

Engines, Steam

Morris Mach. Works
Baldwinsville, N. Y.
Novo Engine Co.
Lansing, Mich.

Engineers

Arnold & Weigel
Woodville, Ohio
Bacon, Earle C., Inc.
New York, N. Y.
Buckbee Co., J. C.
Chicago, Ill.
Fuller Engineering Co
Allentown, Pa.
James N. Hatch
Chicago, Ill.
R. W. Hunt & Co.
Chicago, Ill.
Massey Co., Geo. B.
Chicago, Ill.
Smidth & Co., F. L.
New York, N. Y.
Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.

Excavators

Ball Engine Co.
Erie, Pa.
Owen Bucket Co.
Cleveland, Ohio.

Excavators—Dragline Cableway

Link Belt Co.
Chicago, Ill.
Sauerman Bros.
Chicago, Ill.

(Continued on page 68)

(Continued from page 66)

Explosives
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Fuses
Ensign-Bickford Co.
Simsbury, Conn.

Gas Producers
Morgan Construction Co.
Worcester, Mass.

Gears
Caldwell, H. W. & Son Co.
Chicago, Ill.
Tool Steel Gear & Pinion Co.
Cincinnati, Ohio.

Generators
Sorgel Electric Co.
Milwaukee, Wis.

Glass Sand Equipment
Lewistown Fdy. & Mach. Co.
Lewistown, Pa.

Grates
The Kramer Bros. Fdy. Co.
Dayton, Ohio.

Grinding Mills
Munson Mill Machinery Co.
Utica, N. Y.

Hoists
Chisholm-Moore Mfg. Co.
Cleveland, Ohio
Flory Mfg. Co., S.
Bangor, Pa.
Novo Engine Co.
Lansing, Mich.
Vulcan Iron Works
Wilkes-Barre, Pa.

Hose—Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co.
Cincinnati, O.
N. Y. Belting & Packing Co.
New York, N. Y.

Hydrating Machinery
Atlas Car & Mfg. Co.
Cleveland, Ohio
Kritzer Co., The
Chicago, Ill.
Miscampbell, H.
Duluth, Minn.
Schaffer Eng. & Equip. Co.
Pittsburgh, Pa.
Toepfer & Sons Co., W.
Milwaukee, Wis.

Hydraulic Dredges
Morris Machine Works
Baldwinsville, N. Y.

Industrial Cars
Atlas Car & Mfg. Co.
Cleveland, Ohio
Easton Car & Constr. Co.
Easton, Pa.
Watt Mining Car Wheel Co.
Barnesville, Ohio

Lime Barrels
International Cooperage Co.
Niagara Falls, N. Y.

Lime Kilns
Arnold & Weigel
Woodville, Ohio
Glamorgan Pipe & Fdy. Co.
Lynchburg, Va.
Steacy-Schmidt Mfg. Co.
York, Pa.
Vulcan Iron Works
Wilkes-Barre, Pa.

Loaders and Unloaders
Ball Engine Co.
Erie, Pa.
Jeffrey Mfg. Co., The
Columbus, Ohio

Locomotives
Baldwin Locomotive Works, The
Philadelphia, Pa.
Cummings Mach. Co.
Minster, Ohio.
Fate-Root-Heath Co.
Plymouth, Ohio
Hadfield-Penfield Steel Co.
Bucyrus, Ohio
Jeffrey Mfg. Co., The
Columbus, Ohio
Lima Locomotive Works
New York, N. Y.
Porter Co., H. K.
Pittsburgh, Pa.
Vulcan Iron Works
Wilkes-Barre, Pa.
Whitcomb Co., Geo. D.
Rochelle, Ill.

Motors, Electric
Sorgel Electric Co.
Milwaukee, Wis.

Motor Trucks
Pierce-Arrow Motor Car Co.
Buffalo, N. Y.
Traylor Eng. & Mfg. Co.
Allentown, Pa.

Packing—Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber & Mfg. Co.
Cincinnati, Ohio
N. Y. Belting & Packing Co.
New York, N. Y.

Paint and Coatings
Williams, C. K., & Co.
Easton, Pa.

Perforated Metals
Chicago Perforating Co.
Chicago, Ill.
Cross Eng. Co.
Carbondale, Pa.
Harrington & King Perf. Co.
Chicago, Ill.
Hendrick Mfg. Co.
Carbondale, Pa.

Pinions
Tool Steel Gear & Pinion Co.
Cincinnati, Ohio.

Pipe Joints
Berry Flexible Pipe Joint Co.
Philadelphia, Pa.

Plaster Machinery
Butterworth & Lowe
Grand Rapids, Mich.
Ehrsam & Sons Co., J. B.
Enterprise, Kan.

Portable Conveyors
Stephens-Adamson Mfg. Co.
Aurora, Ill.

Pumps
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
American Manganese Steel Co.
Chicago Heights, Ill.
Kansas City Hay Press & Tractor Co.
Kansas City, Mo.
Morris Machine Works
Baldwinsville, N. Y.

Power Transmitting Machinery
Caldwell H. W., & Son Co.
Chicago, Ill.

Powder
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio

Pulverized Fuel Equipment
Fuller-Lehigh Co.
Fullerton, Pa.
Raymond Bros. Impact Pulv. Co.
Chicago, Ill.

Pump Valves
N. Y. Belting & Packing Co.
New York, N. Y.

Quarry Equipment
Universal Road Mach. Co.
Kingston, N. Y.

Rope, Wire
American Steel & Wire Co.
Chicago, Ill.
Leschen, A., & Sons Co.
St. Louis, Mo.

Scrapers, Drag
Sauerman Bros.
Chicago, Ill.

Screens
Cross Eng. Co.
Carbondale, Pa.
Diamond Mfg. Co.
Wyoming, Pa.
Hendrick Mfg. Co.
Carbondale, Pa.
Jeffrey Mfg. Co., The
Columbus, Ohio
Link Belt Co.
Chicago, Ill.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Stimpson Equip. Co.
Salt Lake City, Utah
Sturtevant Mill Co.
Boston, Mass.
Tyler Co., The W. S.
Cleveland, Ohio
Universal Road Mach Co.
Kingston, N. Y.

Separators
Rubert M. Gay Co.
New York City.
Raymond Bros. Impact Pulv. Co.
Chicago, Ill.
Sturtevant Mill Co.
Boston, Mass.
Tyler Co., The W. S.
Cleveland, Ohio

Separators, Magnetic
Buchanan Co., C. G., Inc.
New York, N. Y.

Shovels—Steam and Electric
Ball Engine Co.
Erie Pa.
Bucyrus Co.
S. Milwaukee, Wis.
Osgood Co., The
Marion, Ohio

Shoveling Machines
Myers-Whaley Co.
Knoxville, Tenn.

Stucco Facings
Greenstone Products Co.
Roanoke, Va.
The Metro-Nite Co.
333 Hartford Ave. Milwaukee, Wis

Tanks, Steel Storage
The Blaw-Knox Co.
Pittsburgh, Pa.
Pittsburgh-Des Moines Steel Co.
Pittsburgh, Pa.
The Stacey Bros. Gas Constr. Co.
Cincinnati, O.

Testing Sieves and Testing Sieve Shakers
Tyler Co., The W. S.
Cleveland, Ohio

Track Equipment
Central Frog & Switch Co.
Cincinnati, Ohio
Easton Car & Constr. Co.
Easton, Pa.

Tramways
Interstate Equip. Co.
New York, N. Y.

Trolleys
Brown Hoisting Mach. Co.
Cleveland, Ohio

Turntables
Easton Car & Const. Co.
Easton, Pa.

Washers, Sand and Gravel
Link Belt Co.
Chicago, Ill.
Smith Eng. Works
Milwaukee, Wis.

Wire Rope
American Steel & Wire Co.
Chicago, Ill.
Leschen, A., & Sons Co.
St. Louis, Mo.

Wire Cloth
Cleveland Wire Cloth Co.
Cleveland, Ohio
Tyler Co. The W. S.
Cleveland, Ohio

INDEX TO ADVERTISEMENTS

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

ESTABLISHED 1902 CHICAGO AUGUST 27, 1921

Member Audit Bureau of Circulations
Member Associated Business Papers
Reprinted From Rock Products of August 27, 1921

Rock Products

Vol. XXIV Chicago, August 27, 1921 No. 18

General view of plant of Luckey Lime and Supply Co., Luckey, Ohio

C. C. Martin, General Manager

New Ohio Lime Plant

Luckey Lime and Supply Company Enters Ohio Finishing Hydrate Field

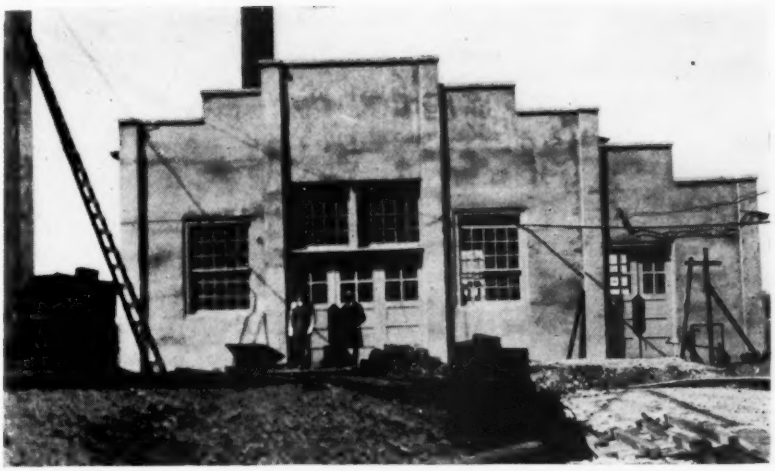
THE LIME PLANT of the Luckey Lime and Supply Co. at Luckey, Ohio, was formally opened on July 19, as announced in our July 30 issue. About one year ago the quarry for this plant was opened, so the formal opening of the plant came as a sort of anniversary. The Luckey plant is reputed to be one of the most complete and up-to-the-minute lime plants in the country.

Quarry Operation

The limestone resources of the company comprise 61 acres of dolomite with the following analysis:

Calcium Carbonate	54.93%
Magnesium Carbonate	45.02%

Wm. Hessman, Superintendent



Boiler room and power house

Crusher plant

Iron	.025%
Silicon	.025%
	100.00 %

At no point on the entire property will more than 2 ft. of stripping be required, and in many places the limestone outcrops. From tests of samples taken from deep borings it is found that the deposit

Well drill

is over 400 ft. deep, with the same analysis throughout. The company will operate the quarry to a depth of about 60 ft.

With the exception of some of the superstructure the entire plant is permanently built of steel and concrete. An inspection shows both the excellent workmanship in its construction and the thought that was given toward making its exterior appearance attractive.

It is the intention of the Luckey Lime and Supply Co. to manufacture only finish hydrate and crushed limestone. The present capacity of the hydrate plant is 150 tons daily and the capacity of the crushing plant is 100 tons a day. Kiln stone, as explained further on, does not go through the crushing plant.

The Crusher Plant

At present the crusher plant is supplied by means of a stiff-leg derrick handling one-yard dump buckets from the quarry. A two-yard rocker dump roller-bearing car receives the stone from a hopper into which the buckets are dumped. This car, operated by an electric cable hoist, deposits the stone on the crusher platform. From the initial No. 4 gyratory crusher the material is elevated by means of a pan conveyor to a revolving screen with three sizing jackets. Under the screen, hoppers distribute the material to three separate loading bins equipped with both bottom and side-loading chutes for loading cars and trucks or wagons.

Lime Plant Operations

For supplying the kilns, 2-yard rocker dump, roller-bearing cars are also used and are hauled up the incline by cable hoists, motor operated. As may be seen in the illustration of the tipple there are two tracks on the incline, passing on the two sides of the kilns and making charging from both sides possible. Besides insuring a more even distribution of material in the kilns, the double haulage system, with two separate electric hoists, will make shut-downs for haulage repairs very unlikely.

The man on top of the kilns operates the hoists from a control house at the top of the incline, from which point he can overlook both the quarry and the charg-stop, start, or reverse the cars at any point.

Loading operation in quarry

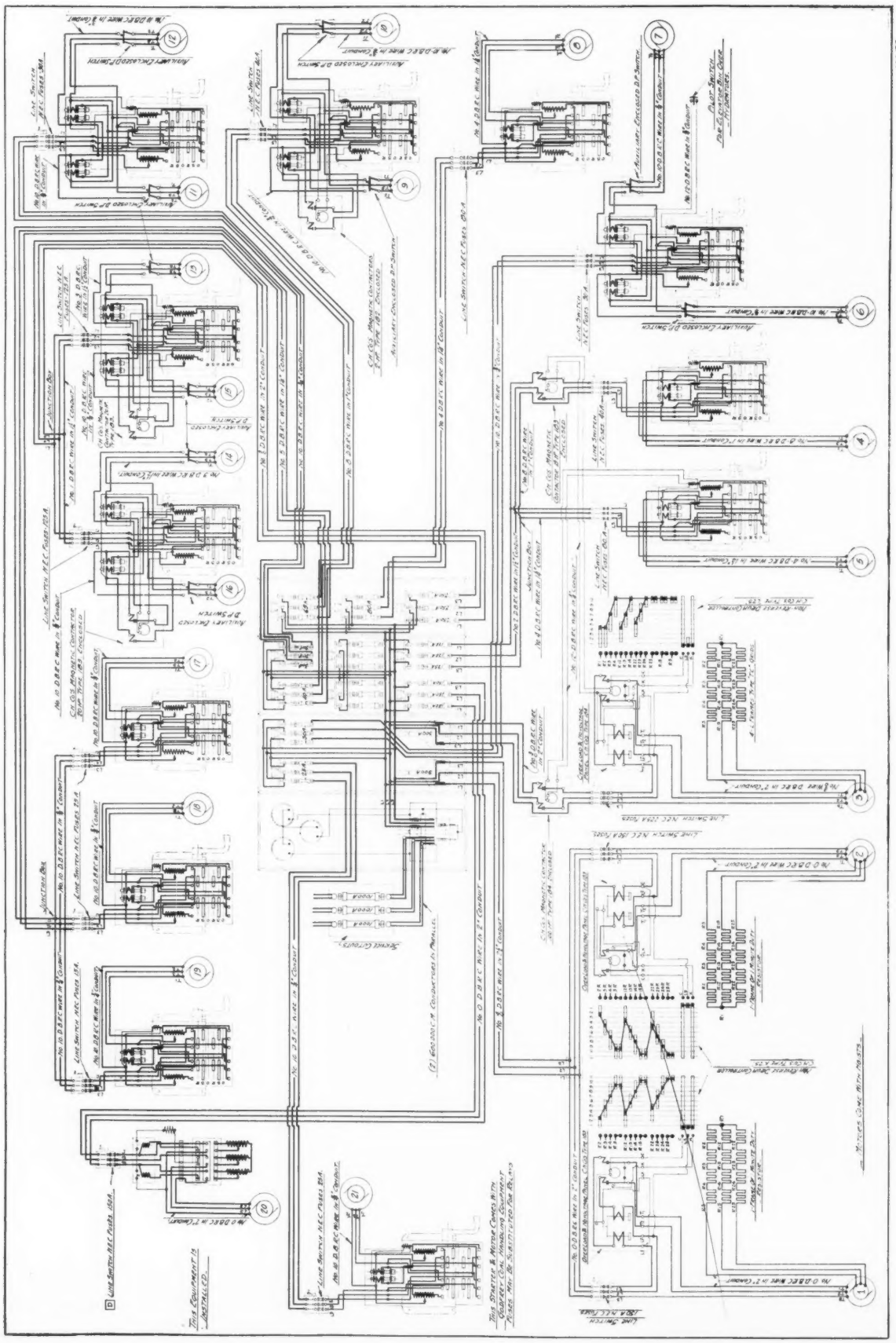


Diagram showing methods of electrical control at plant of Luckey Lime and Supply Co.

Tipple and charging tracks to kiln

All stone for calcining is hand picked in the quarry, and only sizes suitable for burning in the kilns are loaded. Only the stone not suited for calcining is now run through the crushing plant for commercial crushed stone.

The Kilns

The present installation includes six Arnold kilns. In the plant design provision has been made for a second battery of six kilns identical with the first. This second battery, when it is installed, will extend from the present kilns to the bagging-room and bag storage house in the unoccupied space shown in the layout.

The August 14, 1920, issue of Rock Products described the opening of the quarry and gave the layout plan of the kilns, hydrate mill, loading and fuel tanks, and showed the provision for future extension. This plan has been followed closely in actual construction, as may be seen from an inspection of the various illustrations of the completed plant.

The kilns are lined with standard firebrick laid in such a manner that the lining when completed resembles a flattened bottle or flask. Over the six kilns is a storage hopper providing a continuous flow of stone.

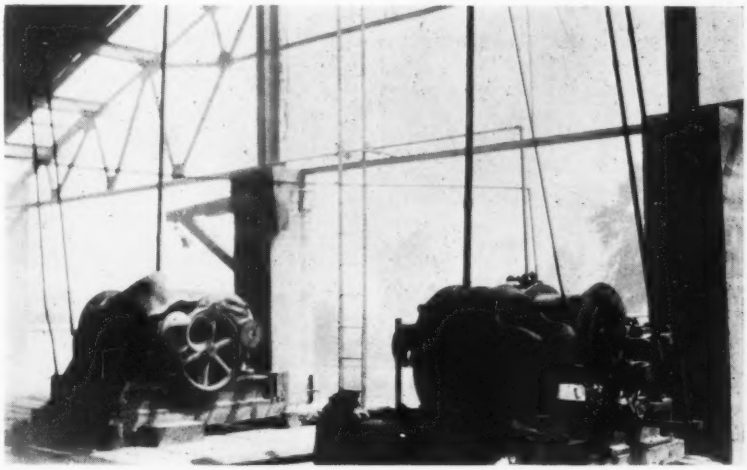
The fireboxes are of the external type and only the gases of combustion come in contact with the stone. Coal screenings are used as fuel, steam being injected under the grates. The coal-handling plant is not yet completed but is now being built. It will automatically convey the fuel from the storage bunkers to the firing floor as it is needed. Each firebox is equipped with "McGinty" shaking grates, manufactured by Kramer Bros. Foundry Co., Dayton, Ohio.

Each kiln is drawn every four hours, there being about four tons of lime to each draw. One feature of this installation is the extra large cooler capacity, insuring a cool lime when drawn as well as the conservation of heat that would otherwise be wasted. Besides increasing the fuel ratio this also improves the product.

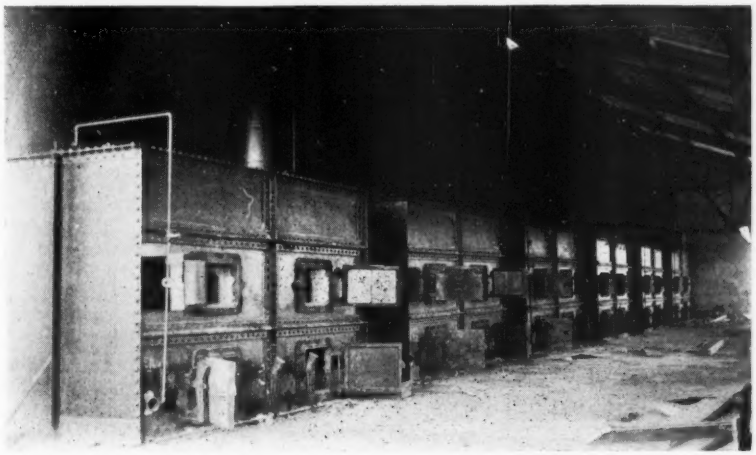
Pneumatic Draw Shears

Pneumatic draw shears make it easy for one man to draw from the six kilns. A dividing wall in the cooler also makes it possible to draw either side or both sides. The shears operate rapidly and permit lumps clogging them to be easily discharged.

The draw-shear controls have been extended to the firing floor so that the firemen can do their own drawing. This makes it unnecessary to signal to the floor below and makes better drawing possible. It also eliminates the draw men required where the drawing is done by hand. It is operating very satisfactorily.



Electrically operated hoists



Furnaces for lime kilns—Note shaking grates

Grinding and Hydrating

Lime drawn from the coolers is carried on a conveyor to a Williams hammer mill, from which the ground lime is elevated about 80 ft. into a steel plate storage tank of 1,500-ton capacity.

Two Clyde batch hydrators are located on the second floor. Ground lime is taken from the hopper bottom of the 1,500-ton storage tank by screw conveyors and is elevated to charging hoppers above each hydrator. The operation of the conveyors and elevators is made automatic so

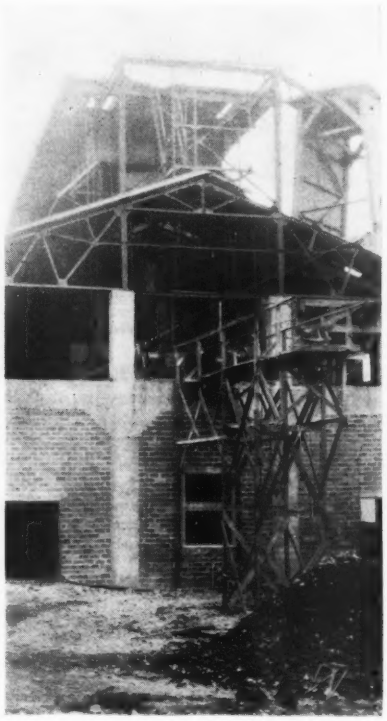
Cooling hopper of lime kiln

that they deliver only the required amount for each charge to the hoppers. The water is similarly measured automatically into tanks above the hydrators.

From the hydrators the lime is drawn into one of the two storage tanks, each with a 300-ton capacity, where it is allowed to season for 24 hours. These two tanks are filled and emptied on alternate days and have been installed with sufficient capacity to take care of the ultimate plant output from 12 kilns. In the present arrangement a double storage capacity for hydrate is provided, which will take care of ordinary shutdowns of grinding and bagging machines.

Interlocking Conveyor Control

In designing all conveying and elevating equipment care has been taken to make it automatic in its emergency operation. The controls are so arranged that the clogging and stopping of any conveyor, elevator or machine, will automatically stop the operation of all equipment that would tend to effect or aggravate the trouble. As an example, if the elevator to the storage tank from the hammer mill clogged or stopped for any reason, both the conveyor feeding the hammer mill and the hammer mill itself would immediately be stopped without any manual operation. This plan has been followed throughout the entire plant.



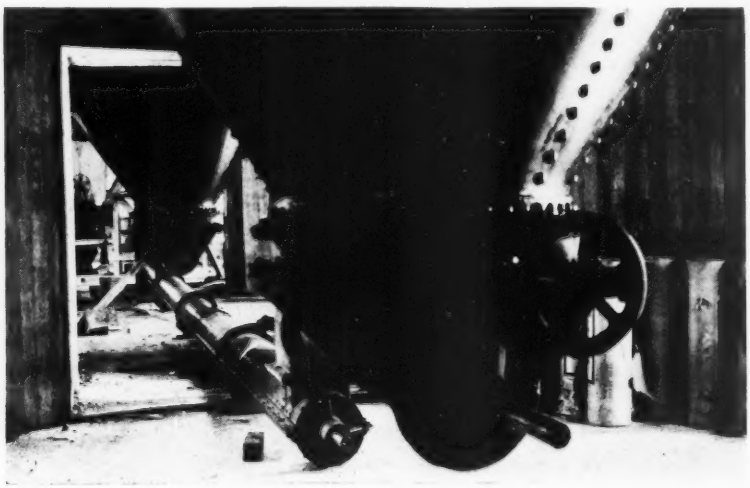
Temporary trestle for handling ash

Apart from the selection and arrangement of the best electrical equipment, the design embodies many features unique in the control of the motors. Especially is this so, when considered from the angle that all standard equipment was used, which is a desirable feature in itself, as it will be an easy matter to secure spare parts in case of repairs.

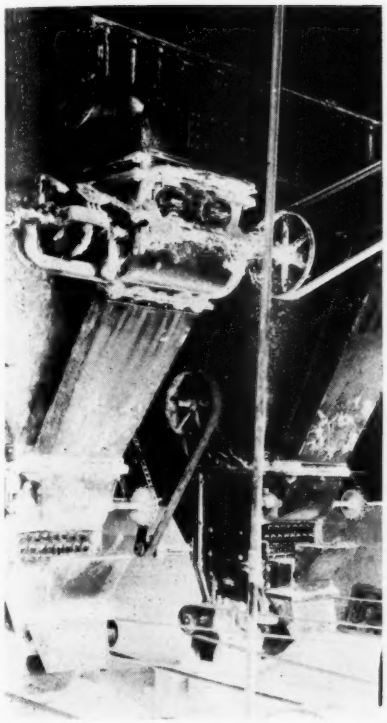
Motors No. 3, 4 and 5 (see accompanying drawing) respectively drive the hammer mill, pan conveyor and elevator. The pan conveyor receives the material and delivers same to hammer mill, which in turn discharges by means of spout to an elevator. There are times when either or all of these units, due to numerous causes, will choke up or overload, and so to prevent such an occurrence the three motors are interlocked by means of magnetic contactors ahead of the line switches for motors No. 3 and 4. The magnet coil of the former contactor is connected in parallel with the no voltage coil of the starting compensator for motor No. 5, while the magnet coil of the latter contactor is connected in parallel with the no voltage coil of overload panel for motor No. 3.

Pan conveyor delivering to Williams mill

To illustrate the operation, consider the elevator to be overloaded, pan conveyor and hammer-mill running normally. Considering overload on the elevator of such proportions as to cause the overload coils on the compensator to trip, which causes no voltage release to trip, stopping motor No. 5, simultaneously magnetic contactor is released, breaking two phases, causing no voltage release to trip, stopping motor No. 3, causing the second magnetic contactor to



Hoppers and screw conveyors underneath hydrated lime storage tanks



Raymond mills

release, breaking two phases, tripping no voltage release on compensator, stopping motor No. 4.

The action being similar to the above in the case where hammer mill would choke, with exception that elevator would continue to operate while mill and conveyor is stopped (a desirable feature), thus permitting the obstructing material to be taken away as fast as removed from the mill.

In the case where pan conveyor is the choked or over-burdened unit, its respective motor would stop by action through overload cells on compensator permitting the mill and elevator to continue operating.

At no time would it be possible to start these motors out of their proper sequence as follows:

Normally starting	*Normally stopping*
5—Elevator	4—Conveyor
3—Mill	3—Mill
4—Conveyor	5—Elevator

However, it is possible to stop them all instantly by releasing catch on compensator for motor No. 5.

Throughout the plant similar inter-locking features are provided, each to meet the individual requirements.

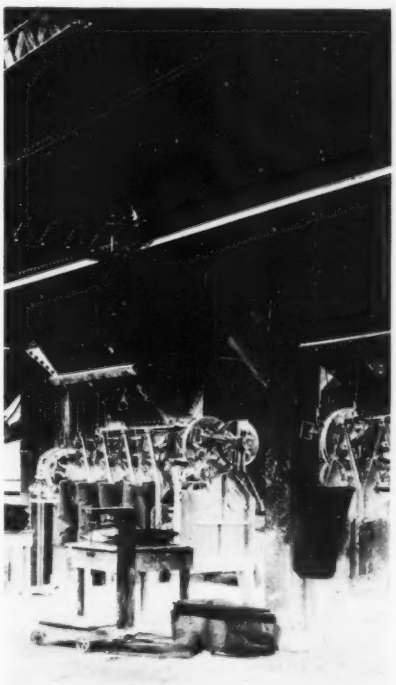
Finishing Mill

Two Raymond mills and air separators take out all impurities from the hydrated lime and pulverize it. The finished product is elevated by vacuum to two storage bunkers over the bagging machines. The capacity of each of the storage bunkers is 280 tons, giving a total bulk storage of finish hydrate of 560 tons.

Bagging and Bag Storage

Two Bates 4-valve bagging machines are installed at the present time. The loading track is immediately in front of the bagging machines, making trucking from baggers to cars easy. There is also a bag storage capacity in one end of the bagging house to take care of at least two days' run.

Storage for fully 15 days' run of the kilns has been provided at this plant, insuring it against shutdowns and slow firing during temporary car shortages or other emergencies.



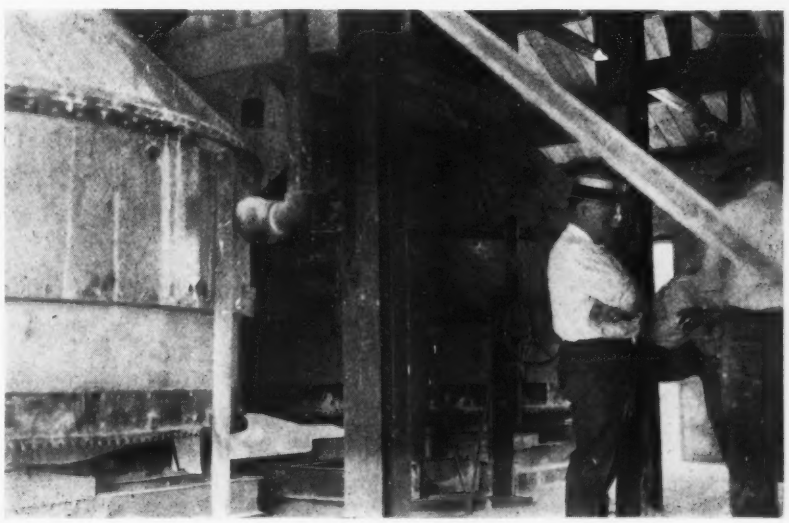
Bates baggers and steel storage bins

Boiler House

The boiler house is located near the corner of the kiln house. This furnishes steam for the kilns and power to operate a deep-well pump and air compressors. Air lines are run to the quarry to operate jack hammers and throughout the plant airhose provide means for blowing accumulated lime dust from the various motors and furnish the power for operating the draw shears.

Personnel

All of the conveying and elevating machinery throughout was made by the Webster Mfg. Co., Tiffin, Ohio. All the machinery is operated by Allis-Chalmers motors. The structural and plate steelwork was done by the Pittsburgh-Des Moines Steel Co. The plant was designed and construction supervised by Arnold & Weigel, contractors and engineers, Woodville, Ohio. William Hessman, operating superintendent of the plant, was also superintendent of construction for the company which handled the building of the plant itself. C. C. Martin is general manager.



Clyde batch hydrators

McGinty Grates
Used in these Six Arnold Type Kilns

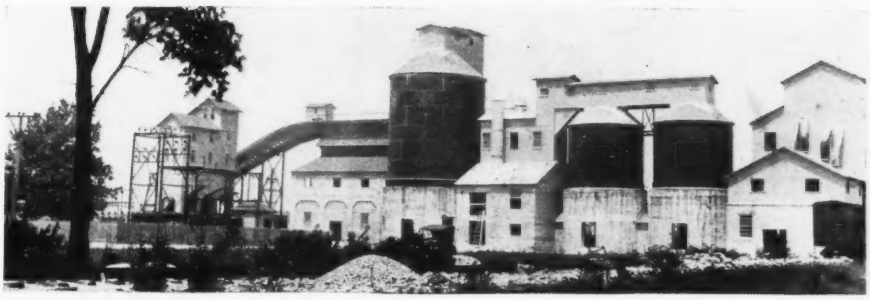
The McGinty Grate, scientifically designed and constructed to meet the high duty and capital requirements of Kiln and Hydrating practice, are now in use in the six Arnold Type Kilns operated by the Luckey Lime and Supply Company at Luckey, Ohio.

This is but one more bit of evidence that engineers are rapidly adopting the McGinty Grate because they will not only withstand a higher degree of heat without warping than any other grate now on the market, but because of the increased air area will carry a deeper bed of fire than is possible on old style bars.

It is a sifting, shaking and dumping grate combined.

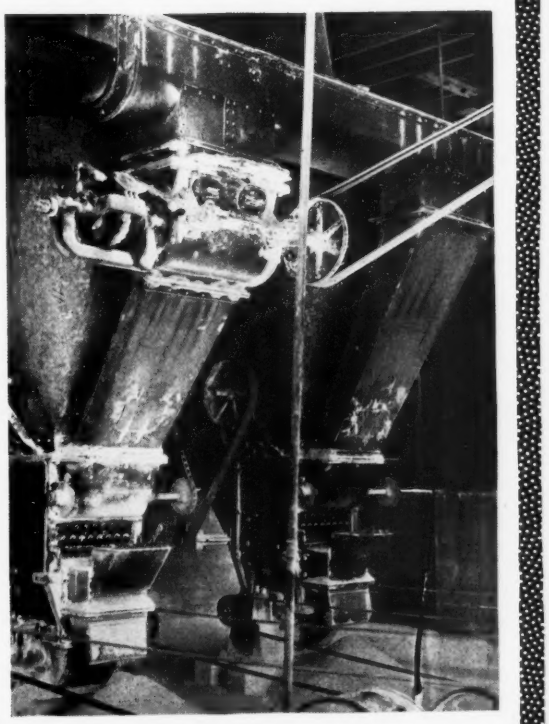
THE KRAMER BROS. FOUNDRY COMPANY
Dayton, Ohio

Our Grates are made of a Material of which the melting point is from 400° to 600° higher than Gray Iron.



The Raymond at the Luckey Plant

The two Raymond Finishing Mills here shown are part of the equipment of the new, up-to-the-minute Luckey Lime plant operated by the Luckey Lime & Supply Co., of Luckey, Ohio.



In low power per ton, low maintenance cost and superiority of product produced, Raymond Pulverizers with air separation outstrip any other type of equipment for handling Hydrated Lime.

Raymond Bros. Impact Pulverizer Co.

1301 North Branch Street **Chicago, Ill.**

Eastern Office
5th Floor, Grand Central Palace
New York City

Western Office
201 Boston Building
Denver, Colo.

The LuckeyPlant is WEBSTER Equipped

The Luckey Lime and Supply Company, of Luckey, Ohio, is the latest organization to acknowledge the superiority of Webster conveying equipment.

Webster engineers can solve your conveying problems. They have access to engineering records covering nearly half a century of uninterrupted achievement and represent a development in material handling far in advance of many present-day conveying problems.

Webster equipment can be quickly and economically installed, and subsequently enlarged to keep pace with expansion, and the saving incident to the installation of dependable, long-lived machinery, makes Webster equipment not only an economical investment, but it quickly becomes a tangible asset.

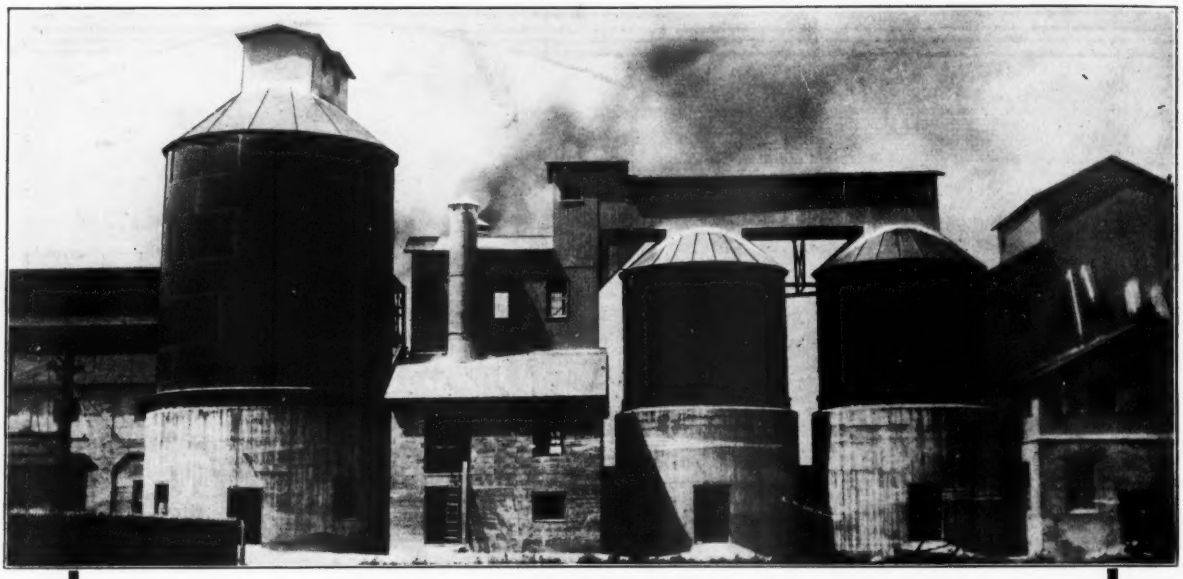
The Webster Mfg. Company

4500-4560 Cortland St., Chicago

Factories—Tiffin, O., Michigan City, Ind., and Chicago

Sales Offices in Principal Cities

WEBSTER ELEVATING AND CONVEYING EQUIPMENT



Plant of the Luckey Lime and Supply Company, Luckey, Ohio

Undivided Responsibility

A divided responsibility is rarely efficient or satisfactory; then why take a chance when DES MOINES shoulders all the responsibility of design, fabrication and erection of industrial plants?

The plant of the Luckey Lime and Supply Company, of Luckey, Ohio, is modern in every detail, and affords an example of the work DES MOINES is equipped to handle. The steel work for the buildings, the three great bins for the storage of crushed limestone are representative of the products of our three fabricating plants.

It should be noted that the service given by DES MOINES is *complete*, from the acceptance of the order to the delivery of the plant, in accordance with specifications. The responsibility for the order is undivided.

Let us call your attention to the fact that we maintain a corps of consulting and designing engineers who are ready at any time to confer with you and your engineers, and for such conference you will be under no obligation whatever.

Write for a catalogue, and let us consider your requirements

Pittsburgh-Des Moines Steel Co.

846 CURRY BUILDING, PITTSBURGH, PA.

DES MOINES, 946 Tuttle Street
NEW YORK, 246 Hudson Terminal
CHICAGO, 1246 1st Natl. Bank Bldg.
WASHINGTON, 946 Munsey Bldg.
SAN FRANCISCO, 346 Rialto Bldg.
DALLAS, 1246 Praetorian Bldg.

Canadian Des Moines Steel Co., Ltd., 246 Inshes Ave., Chatham, Ont.

DES MOINES TANKS TRADE MARK

DES MOINES

DES MOINES TANKS TRADE MARK